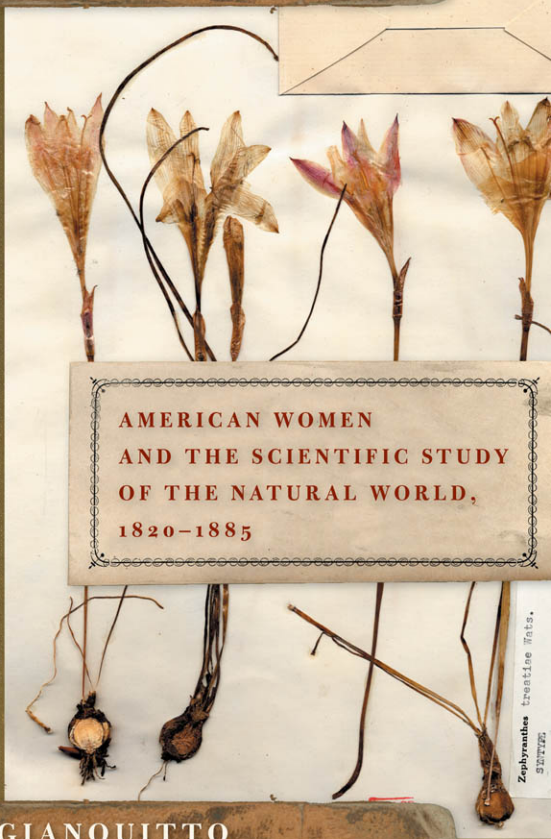
# "GOOD OBSERVERS OF NATURE"




## AMERICAN WOMEN AND THE SCIENTIFIC STUDY OF THE NATURAL WORLD, 1820–1885

TINA GIANQUITTO

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*"Good Observers of Nature"*

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## American Women *and the* Scientific Study *of the* Natural World, 1820–1885

TINA GIANQUITTO

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*"When your soul is utterly weary with shaking hands with pretence,*
*and conversing with make-believes, you too will be ready*
*for such a plunge into the wilderness."*

Elizabeth Wright, *Lichen Tufts of the Alleghenies* (1860)

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# *"Good Observers of Nature"*

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INTRODUCTION

# The Languages of Nature

## *An Overview*

GOOD OBSERVERS OF NATURE examines the intellectual and aesthetic experience of nature for women in nineteenth-century America and investigates the linguistic, perceptual, and scientific systems that were available to women to describe those experiences. Many women writers of this period used the natural world as a platform for discussing issues of domesticity, education, morality, and the nation. Many—especially those writing in the early part of the century—also adhered to the tenets of natural theology in their representations of nature and accordingly pictured the natural world as a moral space designed by a benevolent deity and given to humans as a paradigm of ideal behavior. The value in this view of nature was immediately apparent to women writers: it created a space in which they could encourage their female readers to interact with and learn from nature's example.[1] Women flooded the literary market with beautiful and elaborate flower language books that neatly reduced the diversity of nature to simple associations and restricted its meaning to one defined by established social and religious dicta. These texts, which have long been regarded as the only kinds of writing about the natural world produced by women in the nineteenth century, exploited the emotional and devotional aspects of nature study, often at the expense of its rational or factual elements.[2]

Nature, according to the terms of natural theology and the codes of sentimental flower books, was a web of moral associations that connected the individual to the divine. But it was also the object of intense scientific investigations, and such inquiry into the workings of natural laws threatened to sever those moral associations. Women writers, even those participating in the sentimental flower culture, recognized that scientific developments would eventually lead to revisions of established meanings of natural ob-

jects. As scientists plumbed the depths, seeking to understand the mechanisms driving natural laws, some women writers found themselves drawn to the new languages being used to describe nature. *Good Observers* asks to what extent women writers challenged or modified limiting narrative modes such as those employed in flower language books and utilized scientific terminology to describe the world around them. The book maps the intersections of the main narrative and historical trajectories that inform the answer to this question: the changing literary representations of the natural world in texts produced by women from the 1820s to the 1880s and the developments in science from the Enlightenment to the advent of evolutionary biology. Several other significant cultural and historical trends influenced the ways in which women wrote about nature, including women's education reform and the attendant challenges to conventional notions of domesticity, the shift into literary realism after the Civil War, and the rise of professionalism in the sciences in the latter part of the century. This period was characterized by dramatic upheavals in almost every quarter of American culture. Reformers fought slavery, argued for temperance, and agitated for women's rights, while explorers and naturalists mapped the last unknown spaces on the continent and charted its considerable flora and fauna. Scientific study fed on the new knowledge generated by these discoveries, and scientists set about redrawing the map of nature and humans' place in it. As the vision of nature ordered by the laws of natural theology changed to a conception organized under the rubric of evolution, so did cultural assumptions concerning the relationship between nature and morality.[3]

Women writers in the nineteenth century are typically conceived as avoiding the fundamental yet messy questions concerning humans' place in the scheme of nature that scientific investigation engendered. A brief survey of flower language books bears out this assessment, as any mention of such heady topics as fossil geology or evolutionary theory is largely absent. But a close reading of other types of writing about nature produced by women during the period—botanical manuals, travel narratives, seasonal journals, scientific nature essays—shows instead that many were quite willing to grapple with the interpretative shifts in the meaning of nature that these scientific advances brought to nineteenth-century America. The women writers and amateur scientists examined in this study—Almira Phelps, Margaret Fuller, Susan Fenimore Cooper, and Mary Treat—

read scientific texts and used the information they found there to inform their understandings of the natural world.[4] Phelps, for example, based the method of botanical science underpinning her best-selling textbook, *Familiar Lectures on Botany*, on the work of the prominent botanists of the eighteenth and nineteenth centuries, especially Carl Linnaeus. Fuller read Johann von Goethe's *Theory of Colors* and used his optical theory as the basis for her perceptual strategies, while Cooper read Alexander von Humboldt and learned from him how to see the world as a web of interrelated phenomena. Finally, Treat not only read the work of scientists such as Asa Gray, Charles Darwin, and August Forel but corresponded with them about her research into the plant and insect life around her.

At stake in the texts examined here and in the culture at large is the status of perception. What does it mean to be a "good observer," as Treat called it, of the natural world? Jonathan Crary succinctly summarizes the "problematic phenomenon" of the observer in the nineteenth century when he writes, "Vision and its effects are always inseparable from the possibilities of an observing subject who is both the historical product *and* the site of certain procedures of subjectification."[5] Women looking at nature in the nineteenth century were bound by exactly the equation that Crary details: they were both "historical product" and "the site of . . . procedures of subjectification." The four women examined in this study wrote during the era that Margaret Rossiter describes as the first period of convergence of women and science in America, a time characterized by a struggle between cultural principles that linked women to the home and "emotional feelings and behavior" and science to the "rigorous, rational . . . masculine" realm.[6] These women were the products of the enormous public debate concerning ideal feminine behavior conducted in popular periodicals, advice literature, domestic fiction, flower language books, and discussions of girls' school curricula. This public discourse determined the ways in which women perceived and wrote about the world. At the same time, the public's understanding of women as the moral authority of the home determined these writers' vision of nature as a collection of interrelated domestic spaces. "Good" observing, as expressed in popular advice and educational literature, was thus tied to mental improvement, moral action, and domestic duty. The ideal observer had trained both the eye and the mind to read the scientific and moral geography of nature.

The opening chapter of *Good Observers*, which outlines the contours

of botanical education for girls beginning in the early nineteenth century, looks in on a world in flux. Throughout the seventeenth and eighteenth centuries, scientific study of external nature was organized under the rubric of natural philosophy. This broad category, which read observable natural phenomenon in terms of natural theology, held that a divine hand was at work in the mechanisms of nature.[7] The basic premise of natural theology, first articulated by John Ray in *Wisdom of God Manifested in the Works of the Creation* (1691) and later revived by William Paley in *Natural Theology* (1802), is the "argument from design." Paley argued by analogy that just as a watch found in a field must, of necessity, imply a watchmaker, so must "the contrivances of nature[, which] surpass the contrivances of art in the complexity, subtlety, and curiosity of the mechanism," imply the "*existence* of an intelligent Creator." Furthermore, because those "marks of contrivance, choice, and design" in so vast and encompassing a system as nature surpass the abilities of any one person to create, the designer must be God.[8] Natural theology enables humans to obtain "knowledge of God through reason and the senses," specifically by examining relationships between objects in the natural world, according to Michael Ruse.[9] Scientists operating under this rubric saw nature as a divinely inspired and designed machine in which discrete parts operated as a seamless, emblematic whole that accorded with the revealed theology of the Bible. As Peter Bowler explains, natural theology made clear how the structures of individual species were adapted to their way of life; furthermore, natural theology used the complexity of these adaptations "to proclaim the existence of a God who had gone to great trouble to create a stable world for humankind to inhabit and exploit."[10]

Natural theology together with empirical science reduced nature to a machine. Sensory data provided the raw materials of scientific investigations in the eighteenth century, as empirical scientists relied on the senses to report what was happening in the outside world. This mechanistic model enabled Enlightenment scientists and philosophers to portray the order of nature in terms of a simple hierarchical and progressive pattern that placed "lower" organisms (such as fish) on the bottom rungs of creation and "higher" ones (such as humans) at the top. Taxonomists and others followed suit and went about organizing the increasingly complex world they inhabited into neat, artificial classification schemes based on straightforward, rational patterns. Carl Linnaeus was one hero of this age, and the

classification system he outlined in *Species Plantarum* (1753) revolutionized existing methods of plant classification by simplifying the previously chaotic world of botanical nomenclature. His work is particularly important for this study because it is the model on which many early women writers, including Jane Colden and Almira Phelps, based their descriptions of nature. Linnaeus clarified the procedures for identifying, classifying, and naming plants: his "sexual system," as it was called, organized flora into orders and classes solely according to their sexual characteristics (the number of male and female parts). Furthermore, Linnaeus reduced the complex polynomial Latin identifiers common in botanical nomenclature to binomial ones consisting of a generic name for the genus and a Latin descriptor for the specific epithet. The place of a plant in the system was thus determined by the uncomplicated process of counting stamens and pistils, or male and female reproductive parts, placing the plant in the corresponding order and class, and giving the plant a name appropriate to its taxonomic position. The resulting system was both rigid *and* flexible. In other words, the order of plants in the hierarchical system was fixed by the number of floral parts, but the arrangement of plants within that fixed order was flexible, and newly discovered species could be easily introduced into a preexisting order.

By the 1820s, the popularity of Linnaeus's closed system had waned among the scientific set, whose members were becoming more interested in exploring affinities among natural objects.[11] But educational reformers in America, especially Phelps, following belatedly in the footsteps of their European counterparts, saw real value in Linnaean botanical study for their young female charges. Botanical education was seen to serve several valuable ends: it led girls outside, exercising in the fresh air; it trained them to look for scientific connections among objects in the natural world; and it showed them how to translate those connections into pious lessons for the home. As reformers pushed for increased female education, botany began to assume a prominent role in school curricula. Among the many botanical textbooks published during the period for use in these schools, Phelps's *Familiar Lectures on Botany* (1829) was by far the most popular, and it rapidly became the standard text for secondary school science classes.

Phelps stands out as a botanical textbook writer because she believed in participatory education at a time when most subjects were taught by rote memorization. For Phelps, Lockean empiricism, which privileged sen-

sory experience and employed the mind to process that sensory data, and Linnaean taxonomy, which reduced the world to an easily understandable series of fixed relationships, formed the epistemological and scientific foundations of a woman's perception of and interaction with the natural world. Phelps's method of botanical science, which combined scientific investigation, participatory education, and natural theology, produced a complete woman who was well prepared for the responsibilities of the domestic sphere. She engaged with contemporary scientific debates but refused to compromise the moral fiber of her students as she guided them in their pursuit of knowledge. Phelps encouraged rational investigation in nature study; such investigation would counteract what she saw as the pernicious effects of both emotional overindulgence and popular sentimental flower poetry on the reasoning capabilities of her charges. While the career of *Familiar Lectures*—from its inception through its many editions and finally to its demise—mirrored the increasing strain placed on connections between religion and science during the century, Phelps successfully produced a scientifically oriented text that nevertheless revealed the close connections among the natural, the moral, and the domestic.

Phelps used botany and natural theology to define the connections among science, morality, and the home for women at a time when those in the scientific community debated such connections. Natural theology provided a useful framework for nature investigation because it imbued the environment with a valuable morality: careful observation of the intricate structures and intimate connections of the nonhuman world provided humans not only with a model on which to base their actions but also with a record of their moral development. But the proliferation of knowledge about the systems of nature, spurred in part by technological advances in scientific instrumentation and the fracturing of sciences into discrete disciplines, rendered meaningless the broad category of natural philosophy and its attendant classification systems. Natural theology lost most of its force as well, giving way to the gathering momentum of the physical and biological sciences. The changes were rapid and dramatic. At the broadest level, organicism (the idea of nature as a web of interrelated parts) began to replace mechanism as the dominant model of nature.[12] As scientists sought to escape the limits imposed by artificial systems created by Enlightenment empiricism, attention turned to exploring how systems fit together. Eighteenth-century scientists were adept at identifying the di-

verse forms of the natural world (the *what* of nature). It fell to nineteenth-century scientists to explain the *why* and the *how* of natural systems. For example, Humboldt, the great explorer/naturalist, studied plant geography and wrote "vivid descriptions of plant communities" as he sought to find "correlations between [plant] distribution and that of the physical features of the landscape," as Hugh Raup explains. According to Raup, Humboldt "conceived of geographic areas as *wholes*, within which the total effects were produced by the balanced interplay of many causes."[13] This conception of plant communities informed other influential researchers of the era, notably Antoine de Jussieu and Alphonse de Candolle, important sources for Susan Cooper. Jussieu and Candolle founded and developed the "natural system" of plant classification, which grouped together plants exhibiting morphological and other similarities. The quest for synthesis drove other studies as well: Romantic scientists such as Goethe challenged mechanistic, empirical approaches in optics and in the process staked claims for new subjective observer positions in scientific studies.

Phelps and other early writers encouraged girls to study the world around them, but because they held to static models of nature, they believed that nature told the same story to each observer. The same cannot be said for those writing at or near midcentury, such as Fuller and Cooper, who relied instead on Goethe and Humboldt respectively to teach them how to see the natural world. Both writers shared Phelps's conviction that the accurate perception and representation of nature taught women valuable lessons. But they wrote during a historical moment when perceptual strategies and scientific descriptions of the workings of the natural world were undergoing tremendous revision. Fuller, for example, was preoccupied by ongoing perceptual debates, especially those that challenged the models put in place by Locke. Her preoccupation is clearly revealed in her travel narrative *Summer on the Lakes, in 1843*, an account of her voyage to the U.S. West. Fuller embarked on her trip armed with a perceptual mode that had been shaped by her reading of Goethe's great scientific work, *Theory of Colors* (1810), and by a notion of self-culture derived from exchanges with her fellow transcendentalists. Fuller used her experiences in the dynamic landscape of the West to interrogate traditional epistemological models. The Lockean notion of the mechanistic observer came under specific attack in *Summer on the Lakes*, as Fuller tried out instead the Romantic subjective observer position posited by Goethe in his optical

studies. This observer incorporated both reason and imagination in the process of perception and brought individual experience to the fore in the process of scientific experimentation and nature observation. This position resonated with Fuller, who employed this new perceptual strategy in her rendering of the American West. Despite turning away from the limiting religious modes employed by Phelps, Fuller in many ways shared the educator's concern for the domestic spaces of the nation. But where Phelps was interested in showing how flower study could inform the moral dimension of the individual home, Fuller explored the larger connections between nature and the nation—specifically, the reciprocal relationships between humans and their environment. She used her western experiences to record rapidly changing landscapes and to ask how well humans would use the land they inhabited.

Fuller wrote at a time when the outmoded, static structures of Enlightenment science were being challenged in the popular culture by the new dynamism of contemporary scientific investigation. Advances in geology dealt the greatest blow to both mechanistic science and the connection between natural and revealed theology, as geologists became increasingly unable to reconcile the fossil record with the Genesis account of creation. Charles Lyell, in his monumental *Principles of Geology* (1830–33), took the case against natural theology one step further and plausibly argued against the notion of direction or progression in the organic or inorganic world. Lyell established in his text the uniformitarian position in geology, which argued, among other things, for a "steady-state" view of the earth. According to this view, "the earth was in a perpetual cycle of eruption and decay," and "all periods were essentially similar." Lyell's text set off a storm of controversy, particularly among those geologists, like Georges Cuvier, who adhered to the geologic model that had been termed "catastrophism." Catastrophists argued that periods of geologic stasis were disrupted by periods of intense change (such as flooding); they likewise argued for uniformity and continuity between the past and the present, a view that can be more easily reconciled with the Genesis account of creation and the flood.[14]

The debates involving the hard sciences, especially geology, made it increasingly difficult to link nature study to moral action. Susan Fenimore Cooper addresses this difficulty in *Rural Hours* (1850), a scientifically attuned nature journal written in the midst of these midcentury debates involving the hard sciences and the design of the natural world. Like

Fuller, Cooper was intent on developing rhetorical and perceptual strategies that would enable her to see and understand the natural world. Cooper tested the limits of the languages—scientific, religious, and sentimental—available to describe nature. She adhered to older models that described the natural world as a harmonious space designed by a benevolent God. Yet she also wanted to prove herself as a skilled nature observer well versed in the scientific debates and discoveries of her day. Cooper valued the specificity that scientific observation and language offered but worried that the terms of science threatened to strip both the local and the divine from the picture produced. Unlike Fuller, whose text did not resolve the tensions that ran through it, Cooper found relief for her perceptual crisis in the picturesque aesthetic. The picturesque welded together science and sentiment and allowed for the creation of a harmonious panorama despite the threat of fragmentation. This landscape aesthetic, which relied on relations of parts to a whole and on an attention to how minute details function in creating a panoramic vista, allowed her to utilize the tools of science (careful observation and precise description) to ground her conception of the web of moral relationships that govern the natural world.

Women writers working before the 1860s, especially nature writers such as Cooper, had a distinct advantage over those writing later in the century. Despite dramatic shifts in epistemological and perceptual modes, these writers were able to view the world from a secure teleological position. Nature existed for human use, even if, as Fuller and Cooper taught, humans had to learn to respect the balance of nature in their use of it. But the constellation of dramatic scientific and social events that took place in the 1860s undercut the ability of artists and scientists alike to present coherent, morally viable portraits of the natural world. In science, advances in such fields as comparative anatomy and fossil geology, spearheaded by zoologist Jean-Baptiste Lamarck and anatomist and geologist Cuvier, among others, demonstrated some adaptive development of organisms. As Raup explains, these developments led to new ways of seeing natural objects: "Species or vegetation could be considered not as static things, but as mutable entities of which one could see only an existing expression, and which possessed a past and presumably a future development during which their reactions and forms could be different."[15] Lamarck, Lyell, and Cuvier (who remained unconverted by evolution) paved the way for Darwin and evolutionary biology. Their research, together with a host of works by other scientists,

struck at the notion of design and left room for Darwin to argue *against* design in nature. He argued instead for a directionless evolutionary process that was determined by natural and sexual selection mixed with a heady dose of chance and adaptation. Darwinian evolution in turn struck at the notion of hierarchy in nature and has resulted in a scientific theory that still raises the ire of religious conservatives today.

The publication of Charles Darwin's *On the Origin of Species* (1859) clearly resulted in theoretical and perceptual upheavals, and his extensive data and meticulously drawn conclusions, based in part on the advances in plant biogeography that Cooper discusses in her text, caused ruptures in all branches of science. Darwin's treatment of species adaptation and natural selection and later his investigations into sexual selection and human origins in 1871's *The Descent of Man* dealt the already weakened links of natural theology a final blow.[16] On the American scene, the Civil War and its aftermath profoundly affected reading audiences. With a few notable exceptions, women authors in the decade from 1860 to 1870 turned their attention away from the natural world and focused instead on writing books and articles that appealed to the audience's taste for harder fiction: domestic dramas centering on the moral and sexual evils of slavery, "true" tales of Civil War nurses and spies, and lurid dime novels of seedy city life were among the productions dominating the publishing scene. The pressure of the Civil War, which absorbed the attention of most Americans, was one of the primary reasons that American scientists and writers did not respond immediately, as British audiences did, to the appearance of *On the Origin of Species* in 1859. A telling example of the dominance of cultural as opposed to scientific concerns appears in the prolific correspondence between Asa Gray and Charles Darwin. These scientists, who had for years traded specimens and shared theories, began the decade preparing the world for the advent of evolutionary biology, and letters from 1860 and early 1861 show the two men discussing how best to publicize *On the Origin of Species* in America. But as the Civil War persisted, the focus of their letters shifted to national concerns, and their correspondence became dominated by talk of violence and war.

At around the same time, another phenomenon was occurring. By the 1860s and early 1870s, the young girls Phelps had enticed into botanical study had matured and were beginning to contribute original research to both professional scientists and national publications. Female botanists

compiled elaborate catalogs of local plants and submitted rare specimens to local and national herbaria. Mid- and late-nineteenth-century women such as Charlotte Taylor responded to Cooper's call for more attention to scientific subjects such as entomology and began studying and publishing articles on agricultural pests for popular and governmental periodicals.[17] Sophie Bledsoe Herrick, an accomplished botanist, writer, and magazine editor for *Scribner's Monthly*, wrote articles and books on her studies of insectivorous plants and shared her observations with Darwin. Among these writer/researchers, Mary Treat was the most successful and visible, carrying on voluminous correspondences with such well-known professionals as Benjamin Walsh, Charles Riley, Gray, and Darwin. As science became increasingly professionalized and threatened to push amateurs entirely out of its sphere, these women and others carved out a place in an increasingly hostile environment. At the same time, they marshaled a reignited interest in natural topics in the American reading public and fashioned successful and lucrative careers as professional writers.

Treat's career delicately balanced the worlds of professional science and professional writing. Most of the women covered in this study supported themselves through their writing, but those working in the latter part of the century had to satisfy two audiences: those who ascribed to the new paradigms of nature offered by Darwin's research and those whose moral universe was threatened by those same studies. In many ways, the essays in *Home Studies in Nature*, a collection of Treat's most popular magazine articles, provide superior examples of scientific nature essays written in an effort to bridge these domains. Treat remained bound by the same domestic ideologies that determined the paths trodden by the other women examined in this study. Like Cooper, Treat limited her field of study to the environment surrounding her home. Yet while other writers ranged widely in their investigations of the natural world, she engaged in a systematic and restricted analysis of a carefully delimited area. Under her skillful eye, however, the apparently safe area around her home became a foreign land populated by nature's reviled creatures—spiders, ants, and carnivorous plants. Treat continually played with the idea of home in her text, and she broke down the barriers between inside and outside by welcoming these insects and plants into her domestic space.

Phelps, Fuller, and Cooper struggled to maintain the moral order of the natural world despite scientific advances that threatened that model.

Treat, in contrast, wrote in a post-Darwinian world where the landscape of morality had changed significantly and humans' assumed place at the apex of the hierarchy of nature was no longer secure. Like other late-century writers, Treat was forced to rethink narrative modes in order to develop an approach that could accommodate her interests in nature. In keeping with the trends in the magazines for which she wrote, Treat found the realist mode most suitable to her descriptive purposes. She embraced the form of the scientific laboratory report, put herself in dialogue with contemporary professional scientists, including Darwin and Gray, and refused to limit her knowledge of the natural world via restrictive modes and languages. Rather than abandon either science or morality in the face of evolution, Treat recuperated Darwin for women interested in scientific nature study by showing readers how to witness moral action under the rubric of evolutionary theory.

The growing disjuncture between the perception of nature as emblem and nature as scientific laboratory certainly troubled many of the women writers examined here, including Treat. Some, like Phelps, resisted the increasing pressure to address nature exclusively as a scientific construct—an object to be observed, investigated, and interpreted outside of a moral frame—while others, like Fuller and Cooper, sought to reconcile new scientific models with moral codes. Others, such as Treat, welcomed the opportunity to construct new paradigms for understanding the workings of the natural world, even as the notion of morality and moral action underwent revision in the post-Darwinian world. And while many writers worried that the map produced by the new sciences would strip the natural world of its moral signposts and leave pious observers without the guidance promised by natural theology, most opted to embrace the new ways of seeing the world and the opportunities these new perceptual models offered. Women made room for morality in new scientific and perceptual models by focusing on the construction and maintenance of the homes of the natural world. Even after Darwin, mothers and fathers of many species built homes and cared for their young; if anything, scientific models that dismantled the hierarchy of nature made the relationship between human and nonhuman homes that much closer. However, the tensions caused by the struggle to reconcile sometimes competing views of nature are palpable in all of the texts covered in this study, and the records women naturalists produced

of their observations and experiences of the natural world consequently reflected the anxieties of their time.

Despite their position outside the sciences about which they studied and wrote, the writers covered here believed that women had a responsibility to be educated observers of the scientific as well as the moral and sentimental intricacies of nature, encouraging their female audience to interrogate their ways of seeing and interacting with the world around them. Several key questions guided these writers as they examined women's relationship to the environment. What does accurate perception of the natural world entail, and how can women train themselves to be astute observers of nature? How do emotion and reason interact in the process of nature study? What language or terminology—local, scientific, or moral—best represents objects in nature? And finally, what system—theological, taxonomic, or aesthetic—best represents the relationships that govern the natural world? In the texts, natural theology, perceptual aesthetics, and scientific discourse work together to address these complex issues as writers seek to demonstrate to their readers the close connections between the homes of the nonhuman and human world. As the century progressed and scientists began to challenge the notion of a fixed and hierarchical nature, women writers' perception of the natural world and humans' place in it changed accordingly. As older models began to crumble, these women constructed new definitions of home and community as guides for human interaction with the environment.

These advocates of nature study stand out among the women writers of the nineteenth century and can be understood as case studies that track the changed approaches to nature and science in women's writings over the course of the century and the tensions these changes engendered. The women examined in this volume represent the variety of genres available for writing about nature, including plant catalogs, botanical textbooks, sentimental flower poems and books, travel narratives, seasonal journals, and scientific essays, and each of these authors employed the form(s) best suited to her purpose. All examined how scientific terminology could inform arguments about perception, science, domesticity, and education. All were likewise actively engaged in examining women's relationship to the natural world, yet each fashioned a response to nature that relied on different scientific authorities, with different outlooks on the structure of nature. Phelps

relied on Linnaeus's mechanistic botany; Fuller on Goethe's romantic optical theory; Cooper on a host of comparative scientists such as Candolle, Cuvier, and Thomas Nuttall; and Treat on Darwin's evolutionary biology. All believed that women had a responsibility to be educated observers of the scientific as well as the moral and sentimental intricacies of nature, yet they differed on how women should incorporate the lessons learned in nature into the domestic space. These women were representative of their historical moment in that they largely worked from or commented on the domestic space, yet they were all exceptional as they sought to redefine what it meant for women to inhabit that home. Finally, the authors and texts discussed here interrogate the ways in which women should know about, write about, and interact with the natural world.

CHAPTER ONE

# Botany's Beautiful Arrangement

## *Almira Phelps and Enlightenment Science*

IN A 1755 LETTER to botanist John Gronovius, Cadwallader Colden praises the botanical proclivities of his young daughter, Jane:

> I thought that Botany is an Amusement which may be made agreable for the Ladies who are often at a loss to fill up their time. . . . I have a daughter who has an inclination to reading & a curiosity for natural phylosophy or natural History & a sufficient capacity for attaining a competent knowledge[.] She is now grown very fond of the study and has made such progress in it as I believe would please you if you saw her performance. . . . She has allready a pretty large volume in writing the Description of plants. . . . Two more I have not found described any where & in the others you will find some things particular which I think are not taken notice of by any author I have seen.[1]

Colden had moved his family from New York City to the relative wilderness of the highlands of the Hudson Valley when Jane was six. As a way to help his inquisitive daughter pass the time in their isolated home and to help her restore her health after a lengthy illness, Colden began giving her lessons in botany and in the new Linnaean method of plant classification. By 1740, Jane Colden (1724–66) had turned into a skilled collector. She roamed the countryside around her home and made ink drawings of more than 340 plants she found for her botanic album. She performed these botanical investigations as an "independent researcher," in Sally Gregory Kohlstedt's words, engaging in "private and relatively isolated study" and relying "almost exclusively on informal ways of learning and exchanging scientific information," such as exchanging seeds with professional scientists.[2]

Colden also possessed a rare talent for the kind of descriptive botany central to the Linnaean method. She was so proficient, in fact, that her father regularly discussed her abilities and discoveries in his correspondence with distinguished botanists of the eighteenth century. John Bartram and Alexander Garden, among others, routinely exchanged seeds with young Jane and encouraged her to send them more of her detailed, original descriptions.[3] Colden even named a genus that she discovered, *Gardenia*, for Garden in 1754.[4] English scientists, introduced to Jane's work by her father, also admired her skill and appealed to Carl Linnaeus for public recognition of her work. One scientist, Peter Collinson, wrote a glowing recommendation to the botanist: "Mr. Colden of New York has sent Dr. Fothergill a new plant, described by his daughter. . . . This young lady merits your esteem and does honour to your system." In another letter, Collinson called on Linnaeus to recognize publicly Colden's abilities: "What is marvelous his [Colden's] daughter is perhaps the first lady that has perfectly studied your system. She deserves to be celebrated."[5]

Colden's use of Linnaean botany placed her at the cutting edge of botanical science. Linnaeus had only recently published his great work, *Species Plantarum* (1753), and excitement over his innovations was at its peak. Colden's conversations with professional botanists reveal the advantages a careful study of Linnaean botany had for women, as it enabled them to reach beyond the limited space of the home and outward into the world. But while Colden's botanic album displays a scientifically attuned eye, it also shows that its creator understood the object of her studies: to learn from flowers lessons that would prove useful in the care and management of her future home. Colden's detailed descriptions show that just as she knew how science designated the wild plants around her, so she knew how local women employed these plants in their domestic life. Selections from her *Botanic Manuscript* illustrate this concern for representing these two languages—scientific and domestic—of the natural world. For instance, after giving a systematic analysis of the *Pedicularis tuberosa*, including its appropriate class and order, she notes that the "pedicularis is call'd by the Country People Betony they make Thee of the Leaves, et use it for the Fever & Ague et for sikness of the Stomak." Describing the *Asclepias tuberosa* (butterfly weed), Colden writes that the "Root of this Asclepias taken in powder, is an excellent cure for the Colick, about halff a Spoonfull at a time. This cure was learn'd from a Canada Indian, & is calld in New England

Canada Root." Colden consults her sources and reports that the "Excellency of this Root for the Colik is confirmd by Dr. Porter of New England, and Dr. Brooks of Maryland likewise confirm'd this." She ends this section of her description with a recipe: "One ounce of the Root, chiped into small pieces, to which put a pint & a halff of boiling water, & let it stew for about one hour, of this Decoction drinck halff a Tea cup full, every hour or two, and you bin certainly perfectly cured from the bloody Flux, and better is when you boil the Root in Claret than in Water. This cure was learnd from the Indians."[6]

These domestic applications of plants eventually assumed more importance to Colden than the scientific uses, as the author ended her rich and public botanical career to tend her house after marrying in 1759. This career proved short lived as well: Jane Colden died in childbirth in 1766, but her fame continued past her death as her bound volume of botanical drawings passed through various hands until it made its way into the Natural History Collection of the British Museum. She is now recognized as America's first woman botanist.

Colden's appreciation of the value of plants led her outside, and her botanical studies showed her the connections between items in the world—connections between peoples (Indian and white), spheres (scientific and domestic), and languages (Latin and local). Her approach exhibits one early possibility for women learning and writing about nature, where a healthy dose of the scientific tempered the impulse to the sentimental. Colden, however, may also be seen as an anomaly. Trained by her father, an accomplished scientist, to see the natural world in terms of scientific connections, she was not forced to view nature only as an extension of the home. Such a stance was not possible for women studying botany by the end of the eighteenth century. Linnaeus ordered the plant world according to sexual characteristics: the number of male reproductive parts determined a plant's higher order, while the number of female parts determined its subsidiary class. Linnaeus's gendered and hierarchical system quickly came to be seen as an effective metaphor for human gender relations. Specifically, his sexual system confirmed an ideology that placed women firmly in the home by associating women and their roles as wives and mothers with flowers.

Linnaean botany, with its explicit reliance on sexual characteristics and its implicit confirmation of gender hierarchies, became the rage in the early nineteenth century. Enthusiasm for botanical study permeated almost

every aspect of the popular culture—magazines, fashions, school curricula, home decor, even courting rituals. Flower study, made accessible by Linnaeus's easy-to-learn system, showed women their place in the home, and botany thus increasingly came to be seen as a study ideally suited to women. Energized by the new connections visible in the natural world, women authors in both England and America responded by producing an avalanche of books that exploited the moral, the sentimental, and only occasionally the scientific elements of plant study. Flower poems and floral dictionaries, often published as gift books with lavish illustrations, were among the most popular texts produced during this period.

By the early 1830s, women "doing" botany had become a target for the criticism of popular writers who argued that women's writing about flowers displayed little taste and even less knowledge. Catherine Maria Sedgwick captures perfectly this common view of women writing science in her short sketch, "Cacoethes Scribendi" (1830), where she parodies the aspirations and abilities of a female "writer of botanical dialogues." In this tale, Sedgwick details life in the secluded New England village of H. The town has little to grant it fame, with the notable exception of its dearth of a male population and its corresponding preponderance of widows and maidens. The men of H. either have left to seek their fortunes or have returned to marry the "companions of their childhood" but have died untimely deaths. But rather than bemoan their fate as never-married or widowed women, the town's resourceful, industrious ladies instead enjoy the "advantage of more liberty and fresh air" and pursue a variety of interests that might otherwise be denied them.[7] Writing—poorly executed, as Sedgwick suggests disdainfully—becomes both an intellectual and pecuniary resource for several ladies. Among the most popular and successful of the locally celebrated sketch writers, biographers, and local historians is Miss Anne, a writer of botanical dialogues.

Miss Anne and two of her sisters, Misses Ruth and Sally, are persuaded to pursue writing careers by yet another, more ambitious sister, the widow Mrs. Courland, a writer of Gothic tales who anticipates the money to be earned by such endeavors. Mrs. Courland's dutiful sisters embrace the occupations suggested by their sibling and dedicate their lives to putting pen to paper, each according to her talents and interests. Sedgwick writes that Miss Anne "was fond of flowers, a successful cultivator, and a diligent student of the science of botany." Mrs. Courland believes that "all this

taste and knowledge . . . might be turned to excellent account, and she persuade[s] Miss Anne to write a little book entitled 'Familiar Dialogues on Botany.' " But as Sedgwick makes clear, interest in a subject does not necessarily translate into a competent knowledge of it—the reader never sees Miss Anne searching the countryside for her botanical specimens. Not surprisingly, then, her "dialogues" consist of nothing more than the "clever remarks" of a favorite niece, which have been "faithfully worked up for a circulating medium." As the story progresses, Anne and her sisters embrace the writing life at the expense of their domestic responsibilities, and writing, which began as a hobby, becomes an activity performed at the expense of all others. The home suffers, and, as Sedgwick notes, their parlor, which had been "the general gathering place, a sort of village exchange," becomes a desolate, silent space, filled with baskets of unfinished needlework and knitting.[8]

During the course of the story, Miss Anne becomes a popular writer and begins to take seriously her botanical aspirations. Sedgwick even hints at the possibility that Miss Anne could contribute to the professional world of botany: "Miss Anne had a wild flower in her hand, as she hoped, of an undescribed species." Sedgwick quickly undermines the aspirations and the abilities of this amateur botanist, however, and the sketch ends in a parody. Just as Miss Anne is on the cusp of a potential discovery, a domestic scene erupts, and Miss Anne quickly loses the cool objectivity of the scientist in a fit of "joyful agitation." She "most unluckily [picks the wild flower] to pieces" and thereby loses her potential claim to botanical fame.[9] Miss Anne, then, is not Jane Colden. Botanical study has neither trained her eye to observe accurately her surroundings nor taught her the proper role and duties for women in the home.

Miss Anne exaggerates yet embodies the larger problem that plagued women writing about science and the natural world at the beginning of the nineteenth century: the increasing tension between presenting nature from a stance of objective perceptual accuracy versus that of subjective sentimental piety. Sedgwick was not hostile to botanical education per se. She agreed that firsthand, accurate observation was essential to a girl's healthy development and to her happiness within the "circumscribed firmament" of the domestic scene, as Sedgwick notes in a brief chapter called "Love of Nature" in her domestic advice manual, *Means and Ends; or, Self-Training* (1840). Sedgwick calls on Francis Bacon in this piece and implores her

young readers "to make the beauties of Nature a *study*." Such Baconian empirical study reveals the "great moral uses" of "natural pleasures," which she describes as "ministers of religion" that preserve girls from "dissipation, from evil-speaking, gossiping and coarse pleasures, for their tendency is elevating."[10] Sedgwick's views on education were modeled on Enlightenment ideals, which trained women to be the "moral sex," as Lieselotte Steinbrugge argues. "Knowledge," Steinbrugge explains, "was to be neither an end in itself nor part of preparation for a profession."[11] Instead, knowledge was put to use in the control of the emotions and the management of the domestic space. Miss Anne fails precisely because she allows her scientific pretensions to eclipse her domestic duties and permits her emotions to overwhelm her observational powers.

What lessons can be learned from these figures? Are botanical study and domestic responsibility mutually exclusive, or can domestic women both seek a detailed knowledge of botany and run well-ordered homes? The problematic examples of Jane Colden and Miss Anne offer a good starting point for an analysis of women writing about nature and science in nineteenth-century America. Colden's botanical investigations were not performed out of a selfish motivation to make a mark in a professional world: her study benefited those around her—her father, for example, who liked to brag of his daughter's accomplishments, and her future family, which profited from her knowledge of herbal concoctions and remedies. Miss Anne, conversely, represents the opposite extreme, the weak, overly emotional flower enthusiast who casts all concern for domestic responsibilities aside in her pursuit of flowers. Sedgwick is not alone in her complaints about the less-than-rigorous attitude many women displayed in their study of and writings on nature. But although she paints a harsh portrait of the botanizing woman, the mere existence of such a figure hints at the popularity of the subject and the surprising prominence of women writing about it in the early part of the nineteenth century. References to the advantages of the botanical study recur in fictional narratives throughout the century, as many young heroines are devotees of botanical study. In some books, botanical knowledge enables women to better care for themselves and their families as both mothers and teachers; elsewhere, botanical excursions give young lovers appropriate occasions on which to initiate romances. The intellectual focus of botany protects some girls from vanity and reveals to others the virtues of benevolence.[12] In the real world, not only botany but

chemistry and astronomy were among the popular science subjects taught during this period. For example, Elizabeth Keeney notes that by 1840, 74 percent of New York secondary schools offered courses in botany, while 94 percent offered chemistry classes. Estimates put the number of amateur botanists, male and female, in the hundreds of thousands.[13]

Scientific textbooks of the period, especially those covering botany, give evidence about how women were supposed to reconcile scientific pursuits with domestic responsibility. They also accurately represent the culture's understanding of the relationships among science, sentiment, and morality and can be used effectively to gauge how these relationships changed over the course of the century. The young girls who took up botanical study in the nineteenth century learned that nature itself authorized women's interaction with it. Most textbook writers adhered to the idea that nature was an open book, written by God as a map to the divine. As the moral head of the household, it was a woman's duty to engage with, learn from, and teach by nature's example. Several women writers, such as Jane Kilby Welsh (*Botanical Catechism: Containing Introductory Lessons for Students of Botany* [1819]), Laura Johnson (*Botanical Teacher for North America* [1834]), and Eliza A. Youmans (*First Book of Botany* [1870], *Second Book of Botany* [1873]), capitalized on the interest in scientific topics in general and in flowers in particular, writing botanical textbooks that stressed both the scientific and moral/religious aspects of nature. Almira Hart Lincoln Phelps (1793–1884), however, eclipsed all other authors, male and female, to emerge as the premier textbook writer of the nineteenth century. Indeed, even Sedgwick nods in Phelps's direction: the title of Miss Anne's text, *Familiar Dialogues in Botany*, echoes that of Phelps's enormously popular botanical manual, *Familiar Lectures on Botany* (1829).

Phelps proclaims the mental, physical, and spiritual advantages of botanical study for girls in the opening pages of her *Familiar Lectures*. The "objects of its investigations," she writes, "are beautiful and delicate; its pursuits, leading to exercise in the open air, are conducive to health and cheerfulness." Botany is "not a sedentary study," she warns; it sends students "over the surface of the earth, along the banks of winding brooks, on the borders of precipices, the sides of mountains, and the depths of forests."[14] Botanical study lays bare the designs of nature and reveals to women their close and necessary connection to the natural world. According to Phelps, the combination of scientific investigation, participatory education, and

natural theology in botanical study produces a complete woman who is well prepared to assume the responsibilities of the domestic sphere.

Despite the clear advantages of botany, Phelps complained that girls were routinely "deterred . . . from attempting to gain any scientific knowledge of the vegetable kingdom" by educators who held onto the "mistaken idea that botany was a dry and difficult study."[15] She complained that the primers available for girls' botanical study were woefully inadequate and rife with errors, while the volumes prepared for boys were inappropriate to the aims of female education.[16] Phelps, an influential reformer of girls' education in the 1820s and 1830s and a popular teacher at the renowned Troy Female Seminary run by her sister, Emma Willard, was well placed to correct this popular misapprehension of the value of botany. She crafted a textbook for use in her botany courses and quickly positioned the subject at the center of the intensive science curriculum at Troy and later at the Patapsco Female Institute in Maryland, where she served as principal for fifteen years. The text that resulted from Phelps's efforts was both accessible to beginning botanists and acceptable for female students, uniting the strands of science, religion, and domestic ideology that she saw as essential to understanding botany.

Phelps published *Familiar Lectures on Botany, Practical, Elementary, and Physiological*, the first in her series of elementary science textbooks covering such subjects as geology and chemistry, in 1829. This best-selling manual remained in print (with revisions) for more than forty years and had sold more than 275,000 copies by 1872.[17] The reach of the text was equally dramatic and speaks to Phelps's impact on botanical education in the early to mid-nineteenth century. As Keeney notes, prior to 1830, only 24 percent of female seminaries offered botany; after 1830, that number jumped to 82 percent.[18] Phelps was both an advanced student of botany and a novice instructor of it when she wrote this manual, and her experiences learning and teaching the science drove the construction of the text and the presentation of material. As she writes in the preface to the 1831 edition, "In the course of some years, devoted in part to the study of Botany, and with the charge of a large class, I found the want of a suitable book for beginners, and prepared for the use of my pupils a sketch, of which the following pages are but the filling up."[19] This "filling up" resulted in a lengthy book containing a wealth of information: finely drawn illustrations (both original and borrowed) (see figure 1), detailed lectures in botanical science and

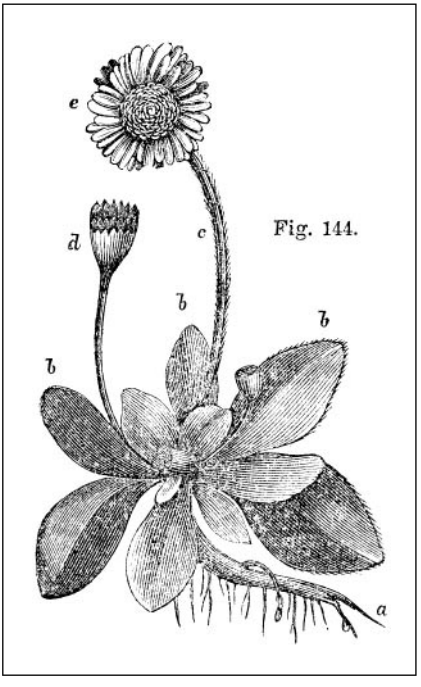



FIGURE 1. Daisy. Phelps notes in the preface to the 1831 edition that the plates accompanying the text are "taken from drawings executed expressly for this purpose by Miss Thirza Lee, teacher of drawing in the Seminary" (*Mrs. Lincoln's Botany*, v). From Phelps, *Familiar Lectures*, 183.

history, comprehensive advice on domestic economy, and even an original floral vocabulary.

The text, which Phelps divided into five sections, begins by presenting general information on various branches of science and on the "system . . . necessary in every science" (*Familiar Lectures*, 13). Botany, Phelps argues in the opening of the book, is such a systematic science, and after completing her introduction, she takes up a detailed presentation (and defense) of her organizing principles. The opening lectures teach the rules of plant structure and classification. Linnaeus serves as the preeminent source for Phelps's botany, although she also draws for comparison from a variety of both older and more contemporary works from such botanists as Joseph Tournefort, John Bartram, Jean-Jacques Rousseau, Charles Mirbel, John Torrey, Alphonse de Candolle, Alexander von Humboldt, and Antoine Laurent de Jussieu.[20] Phelps argues, however, that the rigid structure of Linnaeus's taxonomic system makes botany easily accessible to beginning students. After describing the rules of Linnaean classification, *Familiar Lectures* presents students with specific information on plant anatomy and

physiology, followed by more general discussions of emerging modes of classification, such as those developed by Jussieu and Candolle, the uses of plants, and a history of botany.

In her presentation of botanical science, Phelps adhered to a model of the natural world inherited from the Enlightenment: nature was eminently rational and consisted of a series of interlocking systems. Nature could be known absolutely if the observer had acquired the proper tools of perception and language. Moreover, because nature could be known by its systems, it could be read as a moral space with the power to evoke strong emotional responses in the attentive observer. Phelps, however, also reaches to her Enlightenment sources, especially Locke, for her understanding of the role of emotion in nature study. June Howard explains that for Enlightenment philosophers, "emotions . . . assume a central place in moral thought—they both lead to and manifest virtue." Sentiment derives from the effort to put those individualized, internal emotions to use as moral touchstones, to structure feelings according to socially approved patterns.[21] Morality arises in the complex interaction between emotion as an individual, physical experience and sentiment as the social construction of emotion. Sentiment for Phelps does not carry with it the valence of mawkishness or insincerity; rather, she understands sentiment as "an opinion or view as to what is right," an opinion that stems from "emotional reflection or meditation" and that enables an observer to control powerful emotional responses and channel them into the proper course of right action.[22] Science and sentiment—botanical science and flower poetry—were still closely linked when Phelps began writing *Familiar Lectures*, and she consequently presents to her readers a coherent picture of the natural world as ordered, rational, and moral. Because both science and sentiment constituted essential components of knowledge of the natural world, Phelps's botanical manual serves a dual purpose, fostering both an intellectual/objective *and* an emotional/subjective understanding of the natural world.

Phelps examined epistemological frameworks, botanical terminology, and sentimental flower language to determine which models best represented the natural world to her female students. She theorized a woman's relationship to nature by engaging with current scientific debates in her efforts to produce a useful study guide for her young botanists, but she refused to compromise her understanding of the moral fiber of her female students as she directed their pursuit of knowledge. Finally, her text ac-

curately responded to a culture that considered flower study the primary means to accomplish both religious and romantic devotion. While she ended the lecture section of the textbook with an account of the history of botany, she ended the book with a floral dictionary, "Symbolical Language of Flowers." She acknowledged the emotional appeal of flower study, and she guardedly encouraged her more advanced students to participate in the sentimental flower culture. Phelps was a teacher, after all, and she was keenly aware that she wrote for an audience primed by popular literature to regard flowers as moral emblems and lovers' tokens.

Phelps's recounting of botanical history and her choice of sources reflect a commitment to well-established scientific ideas; in the preface, Phelps identifies her sources and assures readers that she has not "ventured to make any innovations upon the science itself."[23] Elsewhere, she describes her text as a simple attempt to "illustrate and simplify the discoveries and systems of others."[24] Popularizing established ideas was part of her larger project—as Barbara Gates and Ann Shteir note, women science writers such as Phelps "functioned not as groundbreakers, but as educators [and] the scientific theories they conveyed were those that had become accepted." Gates and Shteir argue that these educators "eschewed the controversial partly in order to enhance their authority."[25] Phelps clearly understood her role as a popularizer and not as an innovator of scientific ideas; as Vera Norwood observes, Phelps never claimed status as a professional scientist, nor did she draw on her observations and experiences of the natural world as material for her scientific lectures.[26] Although Phelps's contributions to American scientific culture were publicly recognized when she was made one of the first female members of the American Association for the Advancement of Science, she maintained her mantle of humility when she called herself merely "a humble laborer in the field of education," with no claims to originality or "discoveries."[27]

A survey of Phelps's many writings and speeches shows that she advocated a rich and textured study of many sciences, including geology, chemistry, astronomy, mineralogy, and zoology. While Phelps saw almost all branches of science as suitable for a girl's education, the scope and texture of her *Familiar Lectures on Botany* proves that she held botany in the highest esteem. Phelps believed that a detailed knowledge of this science alone would produce for America pious wives and mothers for its well-appointed homes. Knowledge of botany would also prove that women "may eat of the

tree of knowledge, without danger or sin" (*Female Student*, 321). Phelps's language was not empty rhetoric, however; she believed in science, and she believed that knowledge of science would lead her female students to happy and moral lives. Phelps succeeded in producing a textbook suitable for this purpose, writing a scientifically oriented manual that nevertheless revealed the close connections between the order of the natural world (scientific and moral) and the order of the ideal domestic space.

At the core of Phelps's presentation of botany lies the idea that scientific study offers students a model of right action for their behavior, particularly in the home. The goal of exercising the intellect of the "moral sex," to borrow Steinbrugge's formulation, "is to educate their *moral* judgment."[28] The moral and religious underpinnings of science in general and botany in particular in Phelps's model cannot be underestimated; science, she writes in *The Female Student*, "may well be considered the handmaid of piety" (171). And as she states in the preface to *Familiar Lectures*, botany most perfectly unites science and religion as it leads girls "into paths strewed with flowers" and illustrates "the most logical divisions of Science, the deepest principles of Physiology, and the goodness of God" (8).

Botanical study even had the power to heal the rift that initially distanced women from the natural world—Eve's sinful pursuit of the fruit of the Tree of Knowledge in the Garden of Eden. Phelps combed through a comprehensive selection of scientific, social, and religious sources, looking for appropriate historical antecedents for her female botanists. She struggled to find such authorization until she eventually settled on the biblical figure Eve to locate an absent history of women in botany. Her presentation of the Eve narrative reveals exactly the author's vision of botanical study and the active, inquisitive, and pious women its pursuit would produce.

Phelps begins lecture 43, "History of Botany, from the Creation of the World, to . . . A.D. 770," with the account of the creation of the vegetable world as provided by Genesis; she notes that "God gave to Adam every herb and *tree bearing fruit*" (*Familiar Lectures*, 220). But when she turns to discuss Eve's role in the early history of the world, she shies away from the Genesis account, which focuses on Eve's act of eating the fruit of the Tree of Knowledge. Instead, as Norwood notes, Phelps must "resort to Milton's tale of Adam and Eve's complementary roles in naming the world to locate a space for women's connection to the green world."[29] In Milton's depiction of the exodus from the Garden, readers see a sorrowful Eve, looking regretfully on her flower family:

Must I leave thee, Paradise?, * *
* * * * * Oh flowers
That never will in other climate grow,
* * which I bred up with tender hand,
From the first opening bud, and *gave ye names*;
Who now shall rear ye to the sun, *or rank*
*Your tribes*? (*Familiar Lectures*, 220)

Although Milton's Eve looks longingly at a home she must leave, he nevertheless pictures her as an active participant in the vegetable world. Milton presents Eve as a laborer in the Garden: she rears the plants and—significantly—names and classifies them. The Genesis account reserves this powerful naming role for Adam, but in Phelps's rendering, where the Garden is the domestic space and the plants are Eve's children, Eve achieves a status equal to Adam's.

In controlling the historical narrative that she presents to her students, Phelps fashions Eve into a formidable model and a key ancestor in her female students' "scientific genealogy."[30] Eve becomes a teacher here: she distinguishes the characteristics of plants and is knowledgeable enough to group and name them. But Phelps's refusal to engage with the act of botanical inquiry that resulted in the expulsion from the Garden is telling, indicating her discomfort with the limited models available to women. Eve is, after all, led astray precisely by her botanical enthusiasm—specifically, by her desire for knowledge of the forbidden fruit. Phelps also refuses to engage with other significant yet problematic characteristics of Milton's presentation of Eve—in particular, his censure of Eve's desire for an independent identity and her refusal to submit completely to Adam's will. In *Paradise Lost*, Satan whispers in a sleeping Eve's ear while she dreams that with Satan as her guide, she "flew, and underneath beheld / The earth outstretcht immense, a prospect wide."[31] In her dreams, Eve leaves Adam far behind and transcends the limits (and toils) of the domestic realm.

Both the Genesis account and Milton's retelling of Eve's story nevertheless have the same result: Eve's action permanently disrupts the domestic space. Adam and Eve are cast from their home in the Garden and are forced into an antagonistic relationship with the natural world. The potency of this image—the woman punished and the family cast out as a result of her desire for knowledge—must have resounded with Phelps, who had devoted her life to female education. Phelps understood that for the metaphors

that bound her conception of the relationships among women, science, and nature to remain firm, she had to find a way to recuperate Eve for her audience. Instead of reading Eve's action as dangerous to the stability of the domestic space, Phelps had to produce a narrative of Eve that placed the blame for her sin outside of the female seeker of knowledge.

In *The Female Student*, a series of lectures given to Troy students and their parents, Phelps addresses more specifically the problem of Eve in relation to a woman's quest for knowledge:

> The object in all attempted improvements in female education, should not be to lead women from her own proper sphere, but to qualify her for the better discharge of those duties which lie within it. It is for you to prove by meek and gentle manners, by your pious walk and conversation, that the daughters of Eve may eat of the tree of knowledge, without danger or sin. No law, divine, or human, forbids that the female mind should seek to penetrate the mysteries of science—and may we not hope that the sad consequences of the disobedience of the first woman, will, in some degree, be averted from the earth, by enlightening the minds of her daughters. (321)

Reading Eve's story as a divine indictment of female knowledge is patently wrong, Phelps argues: Eve's sin came not from seeking knowledge but rather from not recognizing—or, more specifically, not being *taught*—the purpose that knowledge was to serve. Phelps does not mince words in her strident defense of female education: at one point, she claims that women, like the "black population" in slaveholding states, are the "slaves" of those who would hold them in "intellectual bondage" (*Female Student*, 47). These cases, Phelps contends, "if not similar, are certainly analogous." Adherents of both physical and intellectual slavery fear "the evils which might result, from enlightening the minds of those, who were destined to a limited and subordinate sphere" (47, 46). The men in power, Phelps claims, fear that Eve will soar free from Adam's dominion and return only to tempt him to evil.

Phelps makes clear that her students are not Eve but rather the "daughters of Eve." These daughters must actively seek knowledge to avoid Eve's fate. Although their space is the home, that home is not "limited," and their position is not "subordinate." In Phelps's rendering, the female seeker of knowledge becomes the educated, Christian mother, a figure that she describes in her advice manual, *Christian Households*: "The knowledge of

books that education may have given her, her own moral and religious training, have now all become more important to her as helps in the performance of her new obligations in aiding the development of the intellect and soul of the immortal beings committed to her care."[32] Despite the work that Phelps needs to perform to recuperate Eve, this figure ultimately enables her to combine the two elements that govern her botanical lessons, science and sentiment. While Phelps's lectures promise to provide the means to conduct objective inquiries into the systems of the natural world, the feelings those inquiries are to produce in the female breast are emphatically subjective. Love of God, fidelity to scripture, devotion to family, and dedication to social responsibility are the sentiments inspired by the workings of the natural world. As Norwood notes, this botanically minded Eve is both mother and scientist—in other words, precisely the scientific mother Phelps promises to create at the beginning of her lectures.[33]

*Familiar Lectures on Botany* becomes the means through which Phelps creates these daughters of Eve. The organization of the botanical manual underscores the idea that an appropriate way to gain and use knowledge exists, reflecting the author's belief in the importance of a student's active participation in the pursuit of education. Phelps's succinct description of her text emphasizes the importance to botanical study of interaction, movement, and direction. She describes the difficult path to knowledge at the beginning of the fourth section: "Hitherto, we have been clearing our way through difficulties, and overcoming obstacles; first, we were obliged to learn and analyze plants according to the strict rules of botanical science; next to examine the organs of plants, anatomically and physiologically; we then investigated the principles of classification . . . and followed the arrangement of plants as presented in these different methods" (*Familiar Lectures*, 201). "Meek" and "gentle" girls whose minds have nevertheless been shaped and sharpened by their study will find before them on completion of their course "an open field . . . presenting a smooth and delightful path" (201).

Every element of *Familiar Lectures on Botany*, including its title and its structure, shows Phelps's greater understanding of humans' place in the divine order of nature. The volume's details also illustrate how she envisioned her individual relationship to her sources and her participation in the project of female education in the sciences. The title in particular reveals how Phelps positioned her text against an established tradition of

botanical textbooks for girls: *Familiar Lectures on Botany* recalls an earlier influential manual, *An Introduction to Botany, in a Series of Familiar Letters* (1796), written by Englishwoman Priscilla Wakefield. The meaning of both titles is informed by primary definitions of *familiar* as "well-known" and "domestic."[34] However, the two books' methods of presenting botanical information to female students differ radically.

Wakefield's didactic text employs the narrative dialogue form, which was, as Greg Myers writes, "a conventional form for the reporting of scientific theories."[35] *Introduction to Botany* is composed of a series of letters on botany written by Felicia to her sister, Constance, who is away for the summer visiting an aunt. Felicia studies botany to check a "depression of spirits" caused by her sister's absence and because, as Felicia explains, her mother thinks that botany "will be beneficial to my health, as well as agreeable, by exciting me to use more air and exercise, than I should do, without such a motive."[36] Felicia writes Constance a total of twenty-seven letters detailing her lessons in Linnaean plant science. Felicia, under the tutelage of her mother and governess, stays comfortably within the domestic realm in her botanical investigations, confining her research to the gardens and fields around her home. As Ann Shteir notes, Wakefield did not challenge a domestic ideology that kept women in the home but nevertheless "enlarged gender habits" by promoting the "good habits and healthy behavior" that botanical pursuits inspired.[37]

The dialogue form quickly became the preferred mode of transmitting popular scientific information to women and children. Shteir writes that the epistolary and the dialogue forms were "foundational narrative modes for fiction, pedagogical writing, and popular science writing."[38] Some notable examples of the form include Rousseau's *Lettres Élémentaires sur la Botanique* (1771–73), Maria Jacson's *Botanical Dialogues, between Hortensia and Her Four Children* (1797), and Jane Marcet's *Conversations on Chemistry* (1806). Women, according to the popular argument, needed some knowledge of science to run well-ordered homes, but because women possessed weak intellects, their science lessons needed to be presented in the simplest manner possible. Popular dialogues on science such as Wakefield's performed this task, showing the practical applications of science in the home to women and girls. The pedagogical strategy employed in these texts, which Myers identifies as the "object lesson," involved careful examination and discussion of concrete objects, which in turn led to the in-

vestigation of the abstract concepts those objects represented. The model, however, was static rather than dynamic: the "developmental narratives" that drove these dialogues depended on "the asking of questions of the right kind in the right order."[39] Such volumes removed objects from their contexts and told students what was important about them; they did not discover such information for themselves.

Phelps acknowledged the value of texts such as Wakefield's as forerunners in scientific education for girls, especially since most popular dialogues presented strong female role models in the mothers, aunts, older sisters, and teachers who directed their young charges' botanical investigations. Indeed, she experimented with the dialogue form in the first edition of her text. Phelps placed questions for teachers to ask in footnotes and indicated that students were to respond to the questions by reading from the main text. She abandoned this restrictive and cumbersome form by the second edition of the text, finding that it did not suit her purposes. She complained primarily that the dialogue form did not require children to discover scientific truths for themselves. Girls in particular were not taught to engage their senses and flex their minds, and as a result, the female sex had "in general, far less observation than the other" (*Female Student*, 221). Phelps deplored the model of passive receptivity—of rote memorization and empty recitation—that characterized girls' education in the 1820s. To illustrate her disappointment at the current state of female education, Phelps gives her readers the example of "two young persons of different sexes, unaccustomed to travelling, [who] find themselves for the first time, on board a ship or a steamboat." The difference in perceptive skills is painfully apparent: "The female probably occupies herself with thoughts of friends from whom she has parted, or of those whom she expects to meet; memory and imagination are busy, but her powers of observation slumber unless perhaps exercised in noticing the dresses of those around her, the peculiarities of manners, and probable standing in society." The young woman, completely absorbed by such frivolous vanities, languishes, while the young man "very likely, examines the construction of the ship, or steamboat, its size, the velocity with which it moves, and the scenery which presents itself" (*Female Student*, 222).

The "difference in the operations of the mind in the sexes" that Phelps illustrates is not immutable, and she encourages her students to rouse their slumbering powers of observation and make experience central to their

educational endeavors (*Female Student*, 222). But as Nina Baym notes, Phelps also is not interested in producing a "visionary romantic": scientific study grounds a student and provides an antidote to the pernicious effects of fantasy.[40] Thus, the real landscape around the city of Troy becomes central to her students' botanical lessons, and they learn by experience to view nature, knowledge, and learning as part of a larger system that can be identified and examined independently but that also fits together as a harmonious whole.

Emma Willard's revolutionary vision of female education echoed Phelps's methodology: both sisters promoted a holistic approach to education and argued that the female student must train the eye and the mind, the spirit as well as the body. As Phelps writes in *The Female Student*, education is "comprehensive" and consists "*in training the body to healthful exercises, and elegant accomplishments, in cultivating and developing the mental powers, in regulating the passions, and above all, in forming religious habits*" (29). Ideal subjects for girls combine these elements, since physical well-being and vigorous health cleanse the mind and make education possible.[41] Above all, they protect the young woman from becoming the dreaded hot-house flower, an unnatural, artificial specimen crafted only for display.

Popular advice manuals, magazine articles, and domestic fiction provided Phelps with additional support for her position on the value of fresh air and exercise, as both physicians and writers advocated physical fitness as an antidote to female invalidism. For example, Mary Treat contributed early in her career to the discussion of the value of fresh air and botanical education in a series of articles on "Botany for Invalids" written in the 1860s. Treat exhorted her readers to head outside, into the fresh air: "Oh, if we could only enforce upon the minds of persons of sedentary habits and poor health the importance, the necessity of pursuing some branch of Natural History! You have no right to be idle in this active world; poor health is no excuse for idleness. Go to work and be of some use to the world!"[42] As Frances Cogan notes, public figures, especially doctors, stridently advocated that the "real woman" follow a program of bracing physical exercise as the initial step on the path to improving the "mental, vocational, and rational abilities of young American women."[43] Exercise even rescued women from physically damaging fashion follies, as corsets and crinoline were, in Treat's words, "entirely out of place in the woods and in climbing mountains."[44] Midcentury nature essayist Elizabeth Wright con-

curred, adding that it "would be as incongruous as stupid to carry finery into our democratic woods." "Short dresses, broad hats, and thick shoes" constituted all that was needed to transform ladies "into as many substantial wood nymphs, ready for scaling rocks and fording streams."[45] Natural philosophy (including botany) was seen as a fitting subject for these wood nymphs to study as it satisfied both physical and intellectual requirements. It is "emphatically a *science of facts*," Phelps writes, but a science that unites physical and mental experience, book learning, science, and theology. "While pursuing it," she encourages her students, "turn your thoughts to the real appearances of nature around you; consider the knowledge of books as nothing, but as it serves to explain the changes which are constantly taking place" (*Female Student*, 221).

Phelps's model demands that the nature observer actively participate in the process of observation, and her pedagogical approach stresses the importance of empiricism in creating conscious seekers of knowledge. Phelps was a well-established teacher before she came to Troy in 1824, after the unexpected death a year earlier of her first husband from yellow fever. But Phelps believed that current approaches to education lacked attention to the real. She found herself part of a larger program of educational reform when she arrived at the Troy Female Seminary, where she found a sympathetic audience for her complaints, especially in her sister, Emma Willard, who had already written geography textbooks and introduced them into the curriculum. Willard's innovative approach to geography turned away from the rote memorization and busywork (tracing and coloring maps) popular in polite education and instead sought to induce students to think relationally, to discern connections among nations and peoples in terms of religion, landscape, manufacture, politics, and so on. Amos Eaton, a famous botanist and founder of Rensselaer Polytechnic Institute, served as an instructor and mentor to Phelps, helping her to develop her ideas on the proper method of teaching botany to girls. Eaton's approach to teaching science, influenced in turn by the innovative educational methods developed by Swiss educator Johann Heinrich Pestalozzi, involved student participation in the learning process and required student presentations and interactive learning. Phelps found Eaton's method of teaching simple but revolutionary, and she quickly incorporated this approach into her botanical lectures at Troy.

Phelps saw her text as educating both pupils and their teachers. In the

prefatory section, "To Teachers," in the expanded 1839 edition of *Familiar Lectures*, she describes her botany class: "On the first meeting of the class, after some explanation as to the nature of the study they are about to commence, each member is presented with a flower for analysis." The flower is typically a "simple one" blooming in nearby fields, and the "names of the different parts of the flower are then explained." The presence of the flower is essential for the student to grasp absolutely the meaning of the terms of the science. As Phelps explains, "If a teacher attempt to define . . . abstract terms, there is danger that the pupil may, from misunderstanding the language used in the explanation, obtain but a very confused and imperfect idea of the definition." Such confusion cannot happen when a student is "directed to dissect and examine her flower." Both the individual and the communal view are important because they *agree*: a "flower which appears to one person to be composed of six petals . . . is seen to be so by another." Students subsequently learn how to distinguish the parts of a flower; to identify the class, order, and genus of the plant; and finally to discover its generic name (*Familiar Lectures*, 8–9).

As teacher and student work through the manual's lectures, both discover another, more compelling reason to study botany. Active study results in a woman who discerns the greater patterns of the natural world and who consequently is happy and secure in her "familiar" space. The domestic scene is broadly construed here, and the familiar transcends the boundaries of the interior space of the home. Indeed, Phelps's female botanizer is *outside*—her entire body participates in the experience of nature. She sees, she smells, and her sensory perceptions lead her to think. Even if the rawness and violence of nature are witnessed, the knowledge of the system that governs the order gives meaning to those events. Nature, Phelps informs her female audience, does not merely provide a passive backdrop to human affairs but rather plays an active role in determining how family scenes unfold. As the family's moral guardian, a woman is duty bound to study and understand the natural world as a model of her domestic realm.

Phelps makes explicit the connection to a woman's happiness in her discussion of botany and the domestic space when she writes, "It is not after a walk among those eloquent witnesses to the power and benevolence of God, and inhaling the morning air from their dewey petals, that a woman would be likely to use ungentle expressions towards her husband, her children, or domestics." Observation and participation in nature provide an

objective antidote to the overwhelming subjectivity, the "peevish and irritable temper," that occur when a woman is "foiled in worldly ambition, when languid from dissipation, or disgusted with a round of empty amusements" (*Female Student*, 70).[46] Phelps reassures her students that the natural world inspires feelings that will ease any frustrations that might arise in the home. The feelings inspired by the dull round of the domestic realm will not overwhelm Phelps's rational botanizer, whose well-trained mind capably examines the emotions that nature study produces. In this view, excessive emotion threatens both the domestic scene and the possibility of rational inquiry into the natural world, but engaging the body (the senses) and the intellect through botanical study will remedy this problem. Such investigation into the phenomena of nature serves a greater social function as well, transforming raw emotion into reasoned sentiment and in turn enabling women to behave in a socially acceptable, benevolent fashion. As Howard explains the connection between sentiment and benevolence, sentiment "coordinates complex recognitions of the power of bodily sensations (including emotions), the possibilities of feeling distant from or connected with other human beings, and benevolence as a defining human virtue."[47] As Phelps's statement illustrates, she writes for a class of girls with the money and time to be subject to the evils of leisure in their adult lives, but these girls also, through proper education, can become ideals of piety and benevolence.

Phelps's language in explicating her model of participatory education—sensation and perception, body and mind—reveals the author's heavy reliance on Lockean empirical philosophy for her conception of the relation between the impact of external objects on sensory apparatus and the corresponding effect on the mind. Indeed, Phelps's statements that "all our thoughts, by means of the senses, are originally derived from external objects" and that "we should add to this original stock of knowledge, by a continued observation of objects addressed to our senses" (*Familiar Lectures*, 33) closely echoes Locke's statements on the origin of knowledge. In *An Essay Concerning Human Understanding*, Locke establishes the connections among sensation ("all *our knowledge of corporeal things lies in our senses*"), experience ("in that all our knowledge is founded"), and ideas ("Whatever *idea* is in the mind is either an actual perception or else, . . . is so in the mind by memory that it can be made an actual perception again").[48] Phelps echoes Locke's materialist philosophy. Her active botanizer gleans

information from the natural world by interacting with that world and then meditating on the sensations received. For her, the external world is broken down into a series of small particles that can be apprehended by sensory organs—"The eye and the ear are themselves but as inlets, through which colors and sound gain access to the mind" (*Female Student*, 64). The eye, once stimulated by a material object, produces a sensation in the body.

Taken together (the process of perception), sense and sensation produce an idea. Understanding—the "power of thinking," as Locke calls it—comes from the mind working to put together the ideas it gathers from interaction with external objects.[49] The shipbound girl in Phelps's example has locked her mind away from her senses; her imagination is active, but her mind slumbers. Instead, as Phelps writes, the mind, once activated "through the agency of the material particles to which it is united," "looks out of itself, and by sensations learns the properties of the material world" (*Female Student*, 64). Phelps agrees with Locke, who, as Eric Wilson notes, "defined knowledge as the mind's correct representation of the nature external to it and established these representations as the foundations of objective truth."[50] In the case of the woman "inhaling the morning air" as she examines dewy petals, the well-trained eye and the pious mind together perceive the "truth" of the natural world as a moral space where natural facts correspond with spiritual truths.

This framework relies on a notion of order and structure that Phelps sees as critical: the natural world is organized according to a divine plan that is eminently rational. Language forms the final part of the equation that connects objects, sensations, and perceptions, providing the means by which the relationships among objects in the natural world can be explicated. Locke views language as a system of accepted meanings that become fixed when a community agrees on their definitions.[51] Phelps concurs. Meanings are intimately connected to the effect of a material object on the senses, and definitions of both concrete and abstract terms arise out of "that state of mind which immediately follows the presence of an external object; [the definition] depends on the connexion between the body and the mind" (*Familiar Lectures*, 23). In Phelps's view, language—the ability to form words and to connect them to "sensible objects"—constitutes a divine gift that enables humans to comprehend "under a few terms, the vast number of individual things, which would, otherwise present to our bewildered minds a confused and indiscriminate mass" (*Familiar Lectures*,

23, 13). Science is a language system that illuminates the design of the universe, but as Phelps reminds her students, language systems describe but do not control processes.

At its core, Phelps's conception of the natural world and the sciences that explicate that world are mechanistic and rely on absolute order and fixity. She opens her lectures on botany with a discussion of the systems that govern both nature and the mind that investigates it. The universe functions according to its own laws and exists independently of human interaction with it. Phelps recalls René Descartes when she argues, "If we had no sciences, nature would present exactly the same phenomena as at present" (*Familiar Lectures*, 13). In *Discourse on Method*, Descartes argues that even if the universe were to revert to a chaotic state, God's "conserving activity," expressed as the laws of nature, would perform precisely as it had before and would produce the same world.[52] Nature's systems cannot be changed by humans but can be understood by them: "It is an important truth, and one which cannot be too much impressed upon the mind in all scientific investigations, that no systems of man can change the laws and operations of Nature; though by systems, we are enabled to gain a knowledge of these laws and relations" (*Familiar Lectures*, 13).

These systems are understandable to the well-trained human mind precisely because they have been designed by a benevolent God who gave humans the rational capacity to understand the design. According to Phelps, "The Deity has not only placed before us an almost infinite variety of objects, but has given to our minds the power of reducing them into classes, so as to form beautiful and regular systems." These regular systems depend on an investigation of external characteristics, because the "power of the mind, so important in classification, is that of *discovering resemblances*." Finally, the mechanistic, "logical and systematic arrangement" of science produces the proper response: "a tendency to induce in the mind the habit and love of order; which, once established, will operate even in the minutest concerns" (*Familiar Lectures*, 13–14).

Phelps's preference for the empiricists' independent yet ordered view of sensation, perception, and understanding led her to Linnaeus to organize her presentation of botany despite her recognition of the limits of his system. Locke gave Phelps the keys to unlock the mechanism of accurate perception. Linnaeus, who revolutionized the language and system of botanical classification, enabled her to translate those mechanisms into the study

of botany. With Linnaeus, complicated plant names composed of multiple descriptors gave way to binomials that identified both genus and "some peculiarity distinctive of the species," as Phelps writes (*Familiar Lectures*, 230). He reorganized the model of the vegetable world by constructing an artificial network of relationships, which Phelps likened to a dictionary, that ordered plants solely according to their sexual characteristics.

Linnaeus revolutionized botany by simplifying the system used to arrange plants. He organized the plant kingdom into classes, orders, and genera. Classes and orders were determined by the number of stamens (male parts) and pistils (female parts) found in the flower. Thus, class I, Monandria, contained flowers with one stamen; class II, Diandria, flowers with two stamens; and so on, in increasing complexity. Classes were then divided into orders, which were determined according to the number of pistils present in the flower: flowers with one pistil were labeled Monogynia; flowers with two pistils, Digynia, and so on. As in a dictionary, where words are arranged only according to the order of their letters and not affinity of meaning, this classification system grouped flowers based on a single, external, artificial, and above all fixed component. This system provided the order necessary for Phelps, who writes, "If species of plants were described without any regular order, we could derive neither pleasure nor advantage from the study of practical botany" (*Familiar Lectures*, 124).

Phelps argues early in *Familiar Lectures* that the appeal of Linnaean taxonomy lies in its accessibility to the beginning student. She valued the precision of Linnaean terminology largely because of the ease with which it enabled students to grasp the complex systems of the natural world. The formalism and specificity of Linnaean nomenclature enabled the botanical enthusiast easily to "relate to material objects . . . to illustrate principles, and define terms by a reference to those objects themselves or to a delineation of them" (*Familiar Lectures*, 23). With Linnaeus, "comparisons became easy, and confusion was avoided," important considerations for teachers trying to impress the subject on their students (*Familiar Lectures*, 230). The simplicity of the Linnaean system undoubtedly contributed greatly to the spectacular rise of amateur botany as a leisure pursuit in the eighteenth and nineteenth centuries.[53]

More importantly, Phelps sees botany as a "practical" study: she devotes an entire lecture to the medicinal, domestic, economic, and indigenous uses for various plants and encourages her students to consider the ways in

which plants can be utilized. In practical botany, the value of the artificial system for students is clear: identification and classification of an unknown plant become a matter of counting floral parts, noting structural features, and then comparing the new specimen with other known species.[54] Although Phelps easily recognized the scientific merit of the more complex emerging "natural" methods of plant classification, these systems presented distinct pedagogical problems. Phelps described the natural system developed by Antoine de Jussieu as "a method of classing plants according to certain distinctions in the seed, which were found to be universal. . . . This method is called natural, because it aims to bring into groups such genera of plants as resemble each other in medicinal and other properties" (*Familiar Lectures*, 232). She considered such a system to be "the grammar of botany," an arrangement that, unlike a mere dictionary, established the rules of relation between seemingly disparate objects. However, learning the natural system would have constituted a nearly impossible task for the girls under Phelps's charge. In the natural system, she writes, "it is necessary to observe many plants, and the most constant characters of their organs" (*Familiar Lectures*, 128). Female students would have generally been unable to garner the time or experience required to make a knowledge of these other systems useful. Not only was the artificial method easier to learn, but the requirement of seeing a large number of plants in a variety of circumstances necessarily precluded the participation of a great many women and girls.

Phelps's reluctance to turn away from Linnaean taxonomy in favor of the more scientifically advanced theories of the natural system botanists, however, did not rest on pedagogy alone. Linnaeus presented the natural world as a designed and defined space, a model that complemented Phelps's view of the structure of the universe. For the rationale governing Phelps's presentation of botany to remain intact, she had to find a way to keep God firmly at the center of the natural world while remaining true to scientific systems that increasingly moved God away from that center. Like other natural sciences, especially geology and zoology, botany in the 1820s underwent a striking transformation as practitioners struggled with paradigm shifts prompted by the dramatic discoveries of the eighteenth and early nineteenth centuries. The exploration and colonization of North America, with its bewildering array of flora and fauna, stretched the ability of even the best taxonomists. Botanists played a significant role in this process of discovery, especially since economic botany was so critical to determining

plants for exploitation in newly colonized areas.[55] Botanists, however, increasingly argued about how the new information should be classified and consequently what narrative of the natural order that classification system would endorse.

Older systems, like Linnaeus's, retained the notion of a harmonious, static, and divinely ordered system in which parts fit together neatly according to a logical and easily ascertained design. This organizational strategy created, in effect, a great chain of being that Peter Bowler describes as "a single, linear, unbroken sequence of species uniting the whole of creation."[56] The pattern of nature was both fixed and eternal and was imagined as "a pigeon-hole system in which the boxes are arranged in a single vertical line stretching down from humankind to the most unstructured mineral substance."[57] For Linnaeus, the structure of nature was both rigid and static, as Erasmus Darwin, Charles Darwin's grandfather, explains in the preface to *The Loves of the Plants*, his controversial yet fashionable erotic flower poem based on Linnaeus's system. Darwin writes, "The illustrious author of the Sexual System of Botany . . . ingeniously imagines, that one plant of each Natural Order was created in the beginning; and that the intermarriages of these produced one plant of every Genus, or Family; and that the intermarriages of these Generic, or Family plants, produced all the Species: and lastly, that the intermarriages of the individuals of the Species produced the Varieties."[58] In contrast, the dynamism of newer models, like Jussieu's, produced a more unpredictable picture of the natural world in which moments of stasis were quickly followed by periods of adaptation and change. As nature lost its designed coherency, humanity's place at the apex of the great chain of being was threatened. Phelps easily admitted the superiority of the natural system for advanced botany students. Nevertheless, she endorsed the Linnaean classification system because Linnaeus organized his system of closed relationships according to the laws of natural theology, which maintained the stability of the chain of being while accommodating new discoveries.

Linnaeus's system also translated easily into a social order that placed humans—specifically males—at the top of the hierarchy of nature. Linnaean taxonomy relied on sexual characteristics to determine a plant's position in the hierarchy of the vegetable kingdom, and as Shteir notes, the implicit social value of Linnaeus's static system was clear: "Plants know their place."[59] While Linnaeus's definitions fixed individual plants (and animals,

because the taxonomy extended to zoology) into a generic, seemingly objective relational structure, the scheme reached beyond botanical science and extended outward into the social world. The system infused all parts of nature's realm with sexuality. But it also shaped "the conduct of male and female, assigning each a preordained part to play in continuing the cycle of life," since, as Shteir notes, Linnaeus "assigned a higher ranking to the class," which was determined by the active male part, and a "subsidiary ranking to the order," which was determined by the passive receptivity of the female part.[60]

By extension, then—and an extension that Linnaeus implicitly made—this taxonomic system confirmed women's place in the home. Linnaeus saw nature as a construct completely bound by both morality and culture, and as Shteir and Londa Schiebinger compellingly argue, his assumptions about plant reproduction and the language that he used to describe it both depended on and reflected traditional gender concepts and hierarchies. The new vibrant and poetic botanical language that Linnaeus created was gender coded, complete with "anthromorphized accounts of brides and bridegrooms, of marriage and conjugal coupling, of 'clandestine marriages' and 'eunuchs' " in the plant kingdom.[61] In *A Dissertation on the Sexes of Plants*, Linnaeus details the experiments he performed to establish plant sexuality. Referring to pollen as the "impregnating powder" and to dew as "genital fluid," he racily describes the process of pollination:

> At the same time that the pollen is scattered, the pistillum presents its stigma, which is then in its highest vigour, and, for a portion of the day, at least, is moistened with a fine dew. The stamina either surround this stigma, or, if the flowers are of the drooping kind, they are bent towards one side, so that the pollen can easily find access to the stigma; where it not only adheres by means of the dew of that part, but the moisture occasions its bursting, by which means its contents are discharged. What issued from it, being mixed with the fluid of the stigma, is conveyed to the rudiments of the seed.[62]

The pistillum and the stigma are the female parts of the flower, while the stamina is the male part. In this description, the female parts remain passive, allowing the male parts easy access. The terms of Linnaeus's description were explicit, and his terminology spawned a wealth of literature that explored the erotic possibilities of the vegetable kingdom.

Darwin's *Loves of the Plants* is easily the most notable of the form. The poem, set in the flower world, presents a lively account of the amorous goings-on in a plant kingdom where male and female parts were rarely found in a one-to-one ratio. Informative and often lengthy footnotes accompany and explain the action of the flowers in the poem. The poet claims to be "only a flower-painter," composing "little pictures" of an animated vegetable kingdom.[63] At the same time, Darwin normalizes proper sexual relations in his poem by characterizing females as either chaste and blushing virgins or predatory seductresses, as in his description of the gloriosa, which possesses one (female) pistil surrounded by six (male) stamens:

> Proud GLORIOSA led *three* chosen swains,
> The blushing captives of her virgin chains.—
> —When Time's rude hand a bark of wrinkles spread
> Round her weak limbs, and silver'd o'er her head,
> *Three* other youths her riper years engage,
> The flatter'd victims of her wily age.[64]

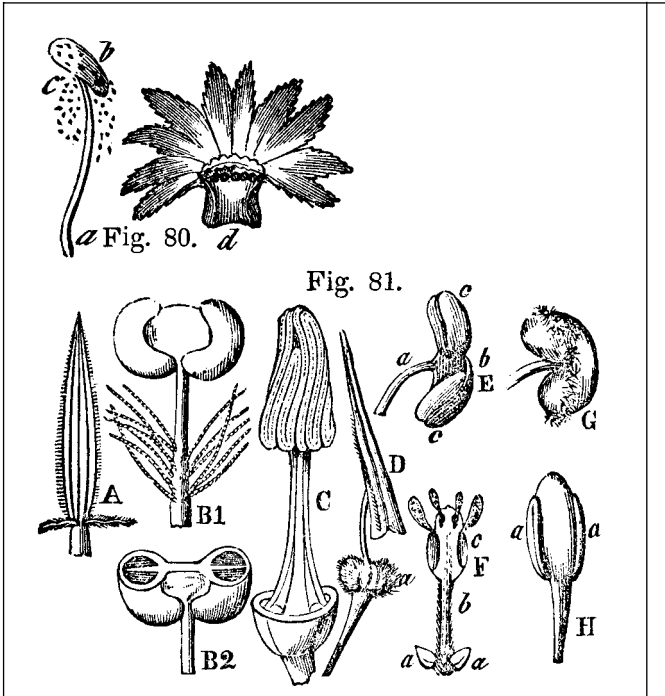
Alone, this description of the female's licentiousness could threaten the social order. But Darwin carefully anchors his fanciful rendering of the single amorous pistil among her willing swains in scientific terms. The footnote accompanying this verse provides a more detailed and scientific explanation of the gloriosa's proclivities: "The petals of this beautiful flower with three of the stamens, which are first mature, stand up in apparent disorder; and the pistil bends at nearly a right angle to insert its stigma amongst them. In a few days, as these decline, the other three stamens bend over, and approach the pistil."[65] Darwin agrees with Linnaeus, who argued that the production of a seed represents the primary end of any flower. Accordingly, the description of the action of the female reproductive organ in the footnote modifies the erotic exploits of the poem's flower, and it becomes clear that the female will do anything in her power to maximize her potential to bear offspring.

Even more pernicious than these characterizations of females, however, is the scientific veneer given to the metaphor for human relations that is rather easily extracted from such botanical descriptions. In *The Moral Sex*, Steinbrugge analyzes the anthropological aspects of Enlightenment thought, specifically as manifested in Denis Diderot and Jean Le Rond d'Alembert's *Encyclopédie* (1751–80). In particular, she discusses the way in

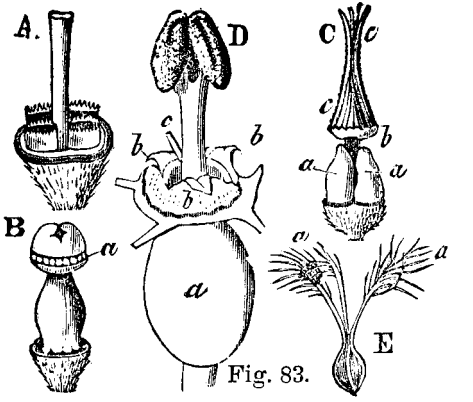
which the authors enclosed deviant (or potentially deviant) female sexuality into the context of marriage to channel the problematic physical nature of women into an acceptable social framework. The effort, she argues, sought to recuperate overly sexual females by enabling them to contribute to the social good by producing children for the nation.[66] Linnaeus took his cue from this representation of female nature. He used his system to naturalize proper sexual relations, as in the "pure marriage" of plants with one male and one female part, and to stigmatize improper ones, as in the "adultery" that occurs in plants with an incorrect ratio of male and female parts. The pure marriage of a perfect flower results in the perfect family—a fruit-bearing union of the active male and the passive female.

The highly charged sexual nature and language of Linnaeus's system clearly bothered Phelps; her discomfort is apparent in her almost complete avoidance of precisely what made his system so popular—its sexual components. The illustrations in lecture 17, the chapter on stamens and pistils, graphically depict this element of botanical study (see figure 2). Yet Phelps turns to Jussieu's tamer vocabulary, which did not depend solely on sexual characteristics, to discuss the actions of the stamens and pistils. Of Linnaeus, she notes only that the "real use of stamens and pistils was long a subject of dispute among philosophers, till Linnaeus explained it beyond a possibility of doubt; these organs have from the most remote antiquity been considered of great importance in perfecting the fruit" (*Familiar Lectures*, 79). Phelps controls the image of Linnaeus that she presents to her reading public by downplaying the sexual and erotic dimensions of his botanical language. Phelps can sanitize the language to suit her purposes, since the details of the poetic language used to describe the actions of those organs are not as important as the system they support.

As a proponent of traditional cultural ideas of women and domesticity, Phelps sees the value in Linnaeus's gendered system. She never imagines—or at least never discusses the possibility—that her female students might be preparing for a life outside the domestic sphere. She uses Linnaeus's descriptive taxonomy to establish the terms of the metaphor that drive her account of botany. As she develops the metaphor in the text, she reminds her students of its function: they are to learn the science of plants "by association." When Phelps states, then, that "the presence of a stamen and pistil, is in botany considered as constituting a *perfect flower*," she is also reminding readers of the ideal domestic arrangement (*Familiar Lectures*,




STAMENS




PISTILS

FIGURE 2. Stamens and Pistils. Illustrations are an essential element of the textbook, but Phelps sanitizes the figures by enclosing them in descriptions of the divine aspects of nature. From Phelps, *Familiar Lectures*, 76, 78.

66). The use of the singular indefinite article is important, as flowers with any other combination of sexual organs are considered "*imperfect*" (*Familiar Lectures*, 66). In detailing these supposedly natural relations of plants, Linnaeus provides Phelps with a model that her students can easily apply to their lives.

Despite the graphic nature of Linnaeus's terms, Phelps rather easily recuperates them for her discussion of botany, women, and female education by tempering scientific discourse with religious and sentimental language. This effort is particularly apparent in lecture 17, where Phelps explains to her students the germination of a seed. Phelps appropriately introduces the subject of how plants are born by reminding her students that carefully studying botany reveals "*laws* of *nature*" that constitute "manifestations of Almighty power" (*Familiar Lectures*, 103). Phelps informs her readers that the "word *nature*, in its original sense, signifies *born*, or *produced*" by "the Creator." Phelps extends the analogy: "The same power, which from a dry, and apparently dead seed, can bring forth a fresh and beautiful plant; can assuredly, from the ruins of our mortal frame, produce a new and glorious body, and unite it to the immortal spirit by ties never to be separated" (*Familiar Lectures*, 103). Warming up to her language, Phelps performs a rhetorical cartwheel by likening the germination of a seed—the "reanimation of the vegetable world"—to the "*resurrection from the dead*!" As the "pious botanist" looks around, "beholding the vegetable species with which the earth begins to be clothed, and seeing successively all the types or representations of past generations of plants, [she] admires the power of the Author of nature, and the immutability of His laws" (*Familiar Lectures*, 101).

Such an understanding of the moral codes of nature does not arise automatically, and flower study entails more than a simple appreciation of flowers as "beautiful objects" that delight the senses "by their odour and fragrance." Instead, the "scientific knowledge of the relations and uses" of the various flower parts opens to a woman's "mental vision a world of wonders" (*Familiar Lectures*, 66). Phelps agreed with other educators who, as Keeney notes, "saw the worth of botany in the skills and values its study enhanced—observation, love of the Creator, and analytical thinking."[67] The objects of botanical study are specifically suited to "induce in the mind the habit and love of order" (*Familiar Lectures*, 14), to "enlarge the mind, and to render life more happy" (*Female Student*, 222). But the

understanding that the woman derives from examining these "relations and uses" of flower parts is specifically that of the natural world as a model for the domestic space. A woman, a daughter of Eve, learns from botany her role—her relations and uses—both in the domestic space and in the larger space of creation. As Seaton shows, the popular sentimental language of flower books had already trained Phelps's audience to organize the natural world in terms of the metaphorical and metonymic meanings behind natural objects.[68]

Phelps draws her readers into the designed space of nature by attracting attention to the flower itself. She makes the connection between the social and the scientific explicit in the opening of lecture 11 ("Calyx"), which contains a detailed discussion of the parts of the flower. Here, she notes how individual flowers function in the social world—"pleasant thoughts" of friends "are awakened by the fresh and perfumed incense which ascends from flowers!" Her description of the sensory impact of the flower draws that flower out of the sentimental world and into the intellectual one, as her description of the impact of the flower on the senses and the mind correspond to what she has already said about the function of sensory experience in the production of knowledge: "Their odour has been poetically termed, the language by which they hold communion with our minds." As the student continues to observe the plant, the aesthetic sense, stimulated by the sensory impact of the object, awakens the intellectual sense: "the beauty of the blossom seems . . . to heighten the pleasure of scientific research" (*Familiar Lectures*, 66).

Flowers serve to recall to a girl's mind a social world bound by moral, religious, and domestic ties. Phelps's floral descriptions illuminate the domestic ideology that drives her botanical metaphors—her female students are to find validation of their assigned roles by seeing them mirrored in the natural world. Flowers, according to the analogy that Linnaeus develops and Phelps adopts, are the plant kingdom's version of a woman. More specifically, flowers constitute the ideal mother. Phelps embraces the flower/woman analogy and uses her descriptions of flowers to warn women to remember their "relations and uses."

Phelps's text repeatedly puts forth pollination and the production of offspring as the female flower's sole reason for existence. Again, Phelps derives her language of the female flower function—to prepare and remain prepared for pollination—directly from Linnaeus's *A Dissertation on the Sexes*

*of Plants*. In performing an experiment with two pots of hemp plants, Linnaeus "permitted the male and female plants to remain together [in one pot], to flower and bear fruit." The plants in the other pot, however, were not so fortunate, as he separated the male plants from the female ones "as soon as they were old enough . . . to distinguish them." "The remaining females," Linnaeus describes, "grew very well, and presented their long pistilla in great abundance, these flowers continuing a very long time, as if in expectation of their mates; while the plants in the other pot had already ripened their fruit, their pistilla having, quite in a different manner, faded as soon as the males had discharged their pollen." The determination of the female plant to attract a mate impresses Linnaeus: "It was certainly a beautiful and truly admirable spectacle, to see the unimpregnated females preserve their pistilla so long green and flourishing, not permitting them to begin to fade, till they had been for a very considerable time exposed, in vain, to the access of the male pollen."[69]

Phelps learns from Linnaeus and his experiments that the production of the seed rather than the flower constitutes the culmination of the function of the plant. She borrows this language and turns it into a warning for her students: While "flowers are indeed lovely," Phelps cautions, "like youth and beauty, they are fading and transient" (*Familiar Lectures*, 66). Beautiful flowers perform important tasks well beyond the period of their fresh beauty: "They are, however, destined for a higher object than a short-lived admiration; for to them is assigned the important office of producing and nourishing the fruit; like them should the young improve the bloom of life, so that when youth and beauty shall fade away, their minds may exhibit that fruit, which is the business of youth to nurture and mature" (*Familiar Lectures*, 66). The girl, like the flower, must "improve the bloom" for two specific reasons. First, an improved life will necessarily improve the home. Properly educated women will avoid the "scandal[s]" that plague the uneducated and frivolous; they will present to society "parlours" that display the fruits of their "intellectual improvement," the "herbariums and books of impressions of plants, drawings, &c. [that] show the taste and knowledge of those who execute them" (*Familiar Lectures*, 32). The parlor, as a semiprivate space marking a border between the world outside the home and the world within, was seen in the nineteenth century as a socially acceptable place to display scientific achievement.[70]

More importantly, Phelps links the production of knowledge directly

to the expected product of the domestic arrangement: children. Willard echoes this sentiment and makes the intent of the floral language clear in a passage from *A Plan for Improving Female Education* in which she writes that one of the mistaken principles of female education "is, that, without regard to the different periods of life, proportionate to their importance, the education of females has been too exclusively directed to fit them for displaying to advantage the charms of youth and beauty. . . . Though well to decorate the blossom, it is far better to prepare for the harvest. In the vegetable creation, nature seems but to sport, when she embellishes the flower; while all her serious cares are directed to perfect the fruit."[71] A woman, like a flower, must be concerned above all else with the "perfection" of her fruits, and an educated, scientific mother whose mind is thus perfected will necessarily produce perfected offspring.

Phelps, though well versed in the language of scientific description, remains wedded to an interpretative schema that resembles the floriography of popular sentimental botanies and floral dictionaries, texts that revealed the moral "meanings" of flowers for the purpose of guiding women through nature to God. Sentimental botanies and flower language books used the minute details of flower structure as moral emblems of ideal Christian behavior and narrowly proscribed definitions of natural objects for nineteenth-century women readers. According to Shteir, this floral language privileged the moral imperatives expressed in the relationships between natural objects and provided participants in the flower culture a "constructed knowledge system with a universal code of meaning."[72] The explosion in the number of sentimental flower books available to readers from the late 1820s through the 1850s serves as a testament to the overwhelming popularity of this type of book in the culture at large. Beautifully illustrated, elaborately bound flower language books appeared in a variety of forms throughout the period, and all attempted to codify the symbolic meaning of a given flower (and a flower that was given). Among the most popular of such volumes were flower dictionaries, which listed names of flowers next to their symbolic meanings; calendar books, which identified specific flowers to be given on specific days; flower fables, which used flowers to relate actions of the mythic creatures of nature; and finally moral botanies, which used the premise of the botany lesson as the starting point for a meditation on divine goodness. Sarah Josepha Hale's *Flora's Interpreter; or, The American Book of Flowers and Sentiments* (1833) was one of the best-

selling flower books of the period, remaining in print with revisions until the 1860s. Hale provided information on flowers' names, their placement in Linnaeus's system, and the "sentiments" they expressed as well as poetic selections that explained precisely how women were to "read" the meaning of flowers received. Despite the beautiful artwork and cover designs, many of these texts, including Hale's, were, in Seaton's words, "exploitative cut-and-paste" jobs, geared toward a consumer culture whose interest in them had been primed by the very botanical education that Phelps advocated.[73] Other women writers shared in the market for these books, and popular titles included Catharine Waterman Esling's *Flora's Lexicon: An Interpretation of the Language and Sentiment of Flowers, with an Outline of Botany, and a Poetical Introduction* (1839), Frances Sargent Osgood's *The Poetry of Flowers and the Flowers of Poetry* (1841), Lucy Hooper's *The Lady's Book of Flowers and Poetry: To Which Are Added a Botanical Introduction, a Complete Floral Dictionary, and a Chapter on Plants in Rooms* (1841), and Laura Greenwood's *Rural Wreath; or, Life among the Flowers* (1855).

Seaton points out the difficulty of determining the real impact of floral books on the behavior of participants in the flower language culture. Fictional characters, however, occasionally relied on the "language of flowers" to help along particularly stubborn courtships.[74] According to Seaton's research, though, little hard evidence indicates exactly how faithfully nonfictional participants in the flower culture heeded the relationship advice offered by these books.[75] The poor writing that characterized many such works certainly led to Sedgwick's parody in "Cacoethes Scribendi." Nevertheless, the popularity of the form testifies to its participation in the burgeoning sentimental "consumer psychology" of the nineteenth century. Lori Merish explains that this "modern consumer psychology" enabled "individuals [to] 'express themselves' through consumption and [to] 'identify' with personal possessions."[76] Consumers were thus trapped in a paradox in which so-called individual identity was derived from mass-produced goods: as Howard writes, "The female culture industry invites women to individuate by becoming generic." Sentiment comes unmoored from its intellectual anchor and becomes merely the "knotting together of emotion, domestic ideology, and commodification."[77] To participate in the flower culture, a man had to buy the appropriate flower book to be used as a key to his floral gifts. Expressions of devotion were thus determined by the market. Women in turn identified their romantic sentiments according to

the books and flowers they received. Planned obsolescence seems to have been at work here as well, since as tastes and popular titles changed, new books needed to be purchased. The flower culture undoubtedly capitalized on the consumer power of wealthy, leisured women and helped both to promote and to produce the ideal domestic woman.

Phelps, an astute observer of her culture, knew that her students most likely participated in this active flower culture. She certainly took advantage of the trend in her push to move botanical study to the center of a demanding science curriculum. This is not to suggest, however, that Phelps did not promote the sentimental aspects of botanical study. Phelps believed that flower study brought the pious woman peace in her home and heart, mind and soul. Yet while Phelps opens the final section of her *Familiar Lectures*, the "Symbolical Language of Flowers," with a brief introduction in which she reminds her students of the preeminence of the "scientific relations which are to be observed in plants," she also concedes that "flowers may also be regarded as emblematical of the affections of the heart and qualities of the intellect" (171). Phelps popularized sentimental as well as scientific ideas, and she accordingly acknowledged the popular floral "authorities" she consults: Elizabeth Wirt's *Flora's Dictionary* (1829), Dorothea Dix's *Garland of Flora* (1829), Eugène Balland's *Les Végétaux Curieux; ou, Recueil des Particularités les Plus Remarquables* (1814?), and Alexis Lucot's *Emblêmes de Flore et des Végétaux* (1819).[78] Phelps's "Symbolical Language" essentially constitutes a dictionary of flower names and meanings. Terms are arranged alphabetically according to the species name of a flower and are followed by a brief description of the meaning of that flower. Most flowers are assigned common names, which generally reveal some distinguishing characteristic of the flower. The harebell, for example, is so called and spelled because some sources contend that the flower is frequently found near the entrances to rabbit holes. Phelps identifies the harebell as the genus *Campanula* and writes that it means gratitude. Other entries include myrtle, meaning love, and the ominous myrtle (withered), meaning love betrayed.

Flower languages appeared in a number of forms in the nineteenth century, but Phelps specifically opts for the dictionary form to present her floral emblems. This decision makes sense in light of Phelps's views on language. She writes early in her lectures that the "great advantage of pursuing studies which relate to material objects, is . . . in being able to illustrate principles, and define terms by a reference to those objects themselves" (*Familiar Lec-*

*tures*, 23). Linnaean terminology, for example, is particularly valuable because it functions like a dictionary in which the student of botany is able to discover a term's meaning by observing the associations of material objects. Reading the dictionary entry, however, and making the proper connection to the meaning are more difficult than may at first appear to be the case. Again, it is necessary to return to another key aspect of Phelps's botany lessons: the centrality of experience in her epistemological framework. As Seaton notes, many flower meanings were traditionally derived from the impact of a plant's color or scent on the senses; understanding these meanings thus required familiarity with the plant.[79] Ideally, by the time Phelps's diligent students of botany turn to the floral dictionary, they will have already sought these flowers out "in their own homes; a dry grove of woods, the borders of little streams, the meadows, the pastures, and even the waysides," all encountered during the required botanical excursions (*Familiar Lectures*, 30). The scientific language of botany, "now familiar to the diligent student," opens up the other worlds of flowers, leaving the student free to "enjoy the pleasant views of the vegetable kingdom which now present themselves" (*Familiar Lectures*, 201).

Most flower language books published in the mid-nineteenth century contained a brief chapter on "Botany," and most stayed well within the bounds of traditional models, basically presenting a simplified brand of the sanitized Linnaean terminology found in Phelps's *Familiar Lectures*. Science was employed to enforce the notion of nature as a space that is static and designed but also readily accessible to women. Writers of sentimental flower books, especially Hale, Osgood, and Margaret Coxe (author of *Floral Emblems; or, Moral Sketches from Flowers* [1845]), saw themselves as contributing to the important project of improving women's minds and souls. Hale's text, for example, is very much about a sentimental understanding of flowers, even though she advocated scientific study for women and, as Baym notes, frequently published useful scientific essays and reviews of scientific books as editor of *Godey's Lady's Book*. Nevertheless, Hale connected the study of botany to the improvement of a woman's moral character.[80] Evidence of this project can be seen in other texts as well, including the preface to Henrietta Dumont's popular gift book, *The Language of Flowers: The Floral Offering; a Token of Affection and Esteem; Comprising the Language and Poetry of Flowers* (1851), which used flowers to bind women to landscape, nation, and home:

> Why has the beneficent Creator scattered over the face of the earth such a profusion of beautiful flowers? . . . Why is it that every landscape has its appropriate flowers, every nation its national flowers, every rural home its home flowers? . . . It is for no other reason than that flowers have in themselves a real and natural significance. They have a positive relation to man, his sentiments, passions, and feelings. They correspond to actual emotions. They have their mission—a mission of love and mercy. They have their language, and from the remotest ages this language has found its interpreters.[81]

Here, Dumont moves her reader from larger, universal terms ("face of the earth") to familiar and intimate ones ("home flowers"), from national concerns to domestic ones. Other writers made the underlying project of linking flowers and flower study to morality even more explicit: as Coxe writes in *Floral Emblems*, "Were it in her power to do so, she would, as it were, *baptize* science, so that it might be made a useful assistant in the cultivation of the moral natures of children."[82]

Coxe's method of crafting moral lessons is impeccable, even though she presents "science" rather haphazardly. The author's way of relating flower structure to the moral emblem derived from that structure is particularly revealing and clearly shows how women are to examine the natural world for clues to the divine realm. Coxe organizes her text around a series of walks taken in the woods with eight little girls, her "students." During one such walk, Coxe happens on a "hairbell" and uses it to illustrate a moral tale. She "plucked the corolla of the flowers from the calyx [the petals from the base], and bade [her] young friends remark the *slender hair-like filament by which it had been attached*; from which circumstance the name Hairbell is derived" (emphasis added). She then delineates the moral lesson to be gleaned from the flower, telling her charges, "Just as delicate, as hidden from the sight of careless spectators, is the hold by which, my children, the heart of even the best Christian is kept dependent on God, the only source and sustainer of spiritual life. The bell which I plucked, was lately blooming on the parent stalk, but having been severed from it, is now withering, and will soon be an unsightly object. So the heart even of a David, could not maintain its spiritual life and beauty, when its dependence on God was weakened by carelessness, and neglect of religious duties."[83] The correspondence between the structure of the flower and the name "hairbell" drives Coxe's presentation of the meaning of the flower, and the moral lesson

gleaned from dissecting the flower supersedes in importance the veracity of the botanical information presented.

Phelps and other educators and writers were disturbed by the sort of moral botany offered by Coxe's *Floral Emblems* and similar sentimental flower books because the accuracy of their scientific terminology was often questionable. A brief comparison of the names and descriptions of a single flower across a variety of sources shows that accurate representation of these objects was often abandoned in the effort to turn the object into an emblem. Indeed, even a quick glance at the most popular sentimental flower books reveals a frustrating lack of consistency in the naming, identification, description, and classification of flowers despite the ordered promise of systematic botany. The harebell receives numerous Latin appellations as well as meanings: various sources place the flower in the genus *Hyacinthus*, *Campanula*, and *Pulmonaria* and give it the meaning gratitude (Phelps), grief (Hale), "Delicate and Lovely as this Flower" (Wirt), "Delicate and lonely as this flower" (Emma Embury, *Love's Token Flowers* [1846]), and faith (Coxe). These inconsistencies, combined with the widespread popularity of such volumes, led to an avalanche of criticism of sentimental flower books later in the century. Writers such as Susan Fenimore Cooper and Elizabeth Wright argued that the inconsistencies of these texts flew in the face of the coherency promised by the science they purported to present and distanced the reader from true plant science.

Wright, a botany teacher in the 1850s and 1860s, concludes a blistering criticism of sentimental botanies in *Lichen Tufts, from the Alleghenies* (1860) by commenting, "If these books, and the counterfeit 'language' they teach, had not usurped the place of the beautiful science on which they have grown like parasites, they would not be worth the trouble of chastising. But when sensible people come to the conclusion that botany amounts to little more than the language of flowers, and that language such idiotic gibberish . . . , surely it is time to enter a protest against such usurpation and desecration."[84] The confusion in naming, however, points to a more significant problem that Cooper picks up at midcentury. Although Phelps prefers the precision of Linnaean terminology for identifying flowers, the author is standing on the brink of a long debate over the naming of flowers—specifically, the erasure of local history that occurs when, as Cooper writes, "a strange tongue sputter[s] its uncouth, compound syllables upon the simple weeds by the way-side."[85]

Whereas many popular sentimental flower books, like Coxe's *Floral*

*Emblems*, open with a cursory discussion of flower study, Phelps's floral dictionary comes well after her lengthy scientific exposition of botany. This seemingly minor structural consideration sets Phelps's dictionary far apart from the sources she consults. Its placement at the end of the text indicates to some degree her reservations about the sentimental aspects of nature. Without the proper tools of perception and language, a woman cannot gain useful knowledge from these texts; she again becomes merely a passive recipient of their pat formulas. The uneducated reader of these sentimental flower books has not been grounded by sensory experience, has not trekked over fields and through streams to interact with flowers in their homes. Phelps's inclusion and placement of this section in her textbook seems to say that flower language constitutes an acceptable component of a girl's interactions with flowers but that the exercise of sentiment is suitable only after the intellect has been thoroughly primed.

The diligence of Phelps's students is hard to determine, although as Keeney shows, courses in botany regularly appeared in girls' schools' curricula until the end of the nineteenth century.[86] Anecdotal evidence cuts both ways. In one copy of the 1839 edition of Phelps's *Familiar Lectures*, an industrious student neatly colored the roots, stems, and petals of flowers in a number of floral diagrams and pressed her botanical specimens between the pages. In contrast, a copy of the 1831 edition shows little signs of such use: its pages, still white despite its age, are marred only by a child's penciled scribbles and by a tulip drawn and colored on the title page. But the text is incomplete—the four-page "Language of Flowers" section has been neatly torn out.[87]

Phelps could write a botanical textbook that included a section on sentimental flower poetry because science and sentiment uneasily shared the stage in early-nineteenth-century culture. Women writers and educators had a particular interest in keeping the two united, as they claimed a right to learn and talk about science precisely because of these connections. Phelps felt but resisted pressure from the scientific community to shape her text according to increasingly rigid scientific standards as the century progressed. To justify her presentation of science, she reminded her readers in the preface to the 1831 edition of botany's larger religious function in women's lives: "These Lectures, although written with a view to teach science, have yet a higher aim, that of leading the youthful mind to view the wisdom, power, and goodness of the Almighty, as manifested in his creation."[88]

By the 1840s, the static view of nature to which Phelps adhered began to crumble. Renowned Harvard botanist Asa Gray, for example, complained about the slipshod presentation of the science of botany in *Familiar Lectures* and strenuously opposed its simplistic and inaccurate picture of the plant world. In response, he produced his *Botanical Text-Book* (1842), which relied on structural and physiological botany rather than the systematic botany found in Phelps's text. Sales of Gray's *Text-Book*, with its more sophisticated understanding of the systems of nature, soon overtook those of *Familiar Lectures*; by the end of the century, Gray's volume had become the most popular botany textbook. Gray relied more heavily on Jussieu's organic natural systems than on Linnaeus's static sexual system and focused on presenting the relationships among plants and plant families. Gray strongly believed that plants were "organized and living beings" and must be understood as such before students could begin to learn classification systems.[89] Gray thus not only anticipated the work of Darwin, of whom Gray was the most vocal supporter in America, but also participated with Margaret Fuller and Susan Fenimore Cooper in the burgeoning mid-century view of the natural world as an organic whole composed of diverse parts.

Phelps directly responded to the attacks of Gray and others, including botanist and educator Alphonso Wood, by reminding her critics of the aim of her text: to train not scientists but rather mothers and educators who had to understand the moral codes in nature that bound the scientific and religious worlds. Furthermore, she argued, she sought to advance the study of botany, not to practice the science. She writes in the preface to the second edition of *Familiar Lectures*, "To some scientific gentlemen, who in condescending to notice so unpretending a volume, have suggested the propriety of rendering it more strictly scientific, the author would reply, that from the first it was only intended as a popular *introduction* to the science."[90] Despite these complaints, *Familiar Lectures* accomplished what the author hoped it would, reconciling the competing strains of theology and science, artificial and natural classification systems, and sentimental and scientific language.

The seeds of issues that preoccupied later writers such as Fuller, Cooper, and Mary Treat lie embedded in the rich soil of this popular botanical manual. Fuller, like Phelps, used readings in science and epistemology to help delineate precisely the mechanisms of perception—specifically, how the eye sees a natural object, how that vision affects the mind, and how the mind

produces/discovers the proper meaning for the object. Cooper followed Phelps's lead, navigating the languages (scientific, local, aesthetic) that most accurately represent what the eye/mind perceives. Treat, a professional scientist writing in the post-Darwinian world, borrowed the metaphors of home and family in her scientific investigations while reconsidering the questions Phelps raised about the value of sense perception and empirical evidence in scientific study. But although women writing later in the century found it increasingly difficult to marry competing ideologies in their representations of the natural world, Phelps's firm belief in the epistemological, scientific, and moral models that undergirded her presentation of botany made them fit nicely into a comprehensive whole. By the time students had finished a course with *Mrs. Lincoln's Botany*, as the text was commonly called, they would be able not only to discuss stamens, pistils, corollas, and calyxes with their future pupils but also to interpret suitors' romantic gestures and to spin moral tales for the children that resulted from these happy unions.

CHAPTER TWO

# The Pressure of Hidden Causes

## *Margaret Fuller and Romantic Science*

HAD MARGARET FULLER (1810–50) been a student of Almira Phelps, she would have undoubtedly been a thorn in the educator's side. Fuller would have challenged her teacher's orderly exposition of the mysteries of nature and the universe and would have demanded to know why the details of taxonomy and classification should matter to the thoughtful nature observer. Mostly, she would have fought the idea that nature tells the same story to each individual observer. Phelps took comfort in fixed systems and rigid taxonomy because her world was a place of harmonious interaction between well-defined parts. Fuller found no such solace in her own observations of the natural world. Yes, Fuller would have agreed, the universe was organized according to fixed principles, and the attentive observer could discover those principles; yes, the universe sought harmony and equilibrium. But, she would have countered, that pattern could not be known unless the mind freed itself from rigid categories, and that harmony came from the union of opposites. Finally, Fuller would have complained that Phelps's methodology left little room for the imagination, for the "pressure of hidden causes" that circulated through the natural world and revealed itself only to the attentive, engaged, and imaginative viewer. Fuller addressed these problems and more in her challenging yet engaging Great Lakes travel narrative, *Summer on the Lakes, in 1843*, which examines how both the specific details and the "hidden causes" of the natural world operate on the body and mind of the attentive nature observer. What, she asks, does precision in observation mean?

Fuller opens her travelogue with a portrait of an icon of the grandeur of the American landscape, Niagara Falls. "It is good to be here," she writes as she contemplates the "unknown drama" of the landscape that marked

the beginning of her summer voyage.[1] Before her trip, Fuller wrote to her friends of her desire and need for "a change of air and scene," for the fresh perspectives to be gained by "an idle outdoors life, mere sight and emotion."[2] She wrote to Sarah Ann Clarke, who traveled along on the trip to the Great Lakes, that she was "constantly unwell, dull, headachs putting me back in everything I undertake."[3] Fuller had just finished "The Great Lawsuit: Man *versus* Men. Woman *versus* Women" and sought both rest from her work as editor of the *Dial* and a chance to free herself from the narrow confines of New England. The summer trip was also motivated by her wish to see a new landscape and to satisfy her curiosity about the "true spirit that animates daily life" of America's frontier families.[4] In June 1843, Fuller, supported both financially and socially by her friends, Sarah and James Freeman Clarke, set out from New York to Niagara Falls and spent the summer traversing the lakes and plains of western New York, Illinois, Wisconsin, and Michigan, including Mackinaw and Sault Ste. Marie. Along the way, she interrogated both the sights she saw and the ways in which she saw them.

Fuller embarked on her trip to the western states armed with a perceptual mode that had been shaped by two main factors: her reading of Johann Wolfgang von Goethe—in particular, her engagement with his *Theory of Colors*—and the lessons in "self-culture" acquired from her conversations with Ralph Waldo Emerson, William Ellery Channing, and other transcendentalists. Goethe's *Theory of Colors* investigated the precise mechanisms of perception, demonstrating that it was an intensely individual and active process involving the senses, the intellect, and the imagination. Goethe's nature vibrated like the American landscape Fuller saw: he found equilibrium and harmony there, even if it was "equilibrium in inequality, opposition of similarity, harmony of the dissimilar."[5] Fuller gleaned from the combination of transcendentalism and Goethe a formula for active perception, a way of seeing the natural world that unfixed the landscape and environment from preconceived definitions. During her western travels, Fuller confronted a landscape markedly different from the settled places of the East, and the dynamic American frontier became an ideal testing ground for her perceptual engagement. As she witnessed the settlement of the frontier and as she later wrote about that witnessing, Fuller began to comprehend the limits as well as the value of these perceptual formulas, and she attempted to construct a new model that fit the unsettled spaces of the West.

The narrative Fuller wanted both to experience and to record in *Summer on the Lakes* tells a tale of the creation of the ideal American in the "cauldron" of the west (*Summer*, 18). The book's seven chapters trace the geographical arc of Fuller's trip, a roughly circular tour of the Great Lakes that begins in Niagara Falls and extends north and west to Chicago and Milwaukee, Mackinaw, and Sault Ste. Marie; south to Pawpaw, Illinois; and back to Buffalo, New York. She uses each geographical location as a site for literary-philosophical meditations on perception, harmony, nature, gender, and the nation. The harmony that she seeks is the union between the frontier and the frontiersperson, between the natural world and the settler home—the proper mixture of beauty and utility in the American context.

The landscape of the rapidly diminishing western frontier provided the author with an ideal and necessary space in which to engage the central problem of use versus beauty in conceptions of the natural world. Fuller understood nature as a frontier: like the nation growing on it, she saw nature as full of possibility, ready to be cultivated but still at risk from "sordid" forces. Yet she often doubted whether either the ideal American landscape or the ideal American citizen would ever emerge. Indeed, she ends her narrative with a wish and a warning: "We want a more equal, more thorough, more harmonious development, and there is nothing to hinder from it the men of this country, except their own supineness, or sordid views" (*Summer*, 147). A nascent environmental ethic, on which Susan Fenimore Cooper subsequently built, derives from this text, as Fuller cautions her readers that individuals also have responsibilities toward the natural world. The portrait of the American scene that emerges from her troubled interaction with the frontier reveals her preoccupation with the core questions: How well will human communities use and preserve the landscapes they inhabit? What will happen to the American scene when its wild places have been subdued by the "mushroom growth" (*Summer*, 18) of frontier settlements? She posits in response that the ultimate success of the American nation rests with the individual who is able properly both to perceive and to use the natural world.

Throughout her narrative, Fuller reads the damage done to the landscape by the march of civilization as oppressive both to the land itself and to the people who inhabited it, settlers and American Indians alike. Toward the end of *Summer on the Lakes*, she becomes increasingly concerned with reproducing the portrait of tribal cultures that she sees degenerating before

her eyes. She privileges these cultures, which in her view have successfully struck a balance between concern for maintaining the beauty of the natural world and using that world to provide material subsistence. The appealing placement of homes and villages, the knowledge and use of flowers and plants as remedies, and the gentle impact of these cultures on the land in general should serve as a model for the conquerors of these "vanquished races." Fuller posits this alternative model as the potential remedy for Americans' "love of *utility*" (*Summer*, 5).

Fuller was clearly caught in a moment of physical, intellectual, and imaginative unrest during her trip to the West, and she hoped that the dynamism of frontier landscapes would free her from New England's static physical and intellectual geography. Fuller's experiments with narrative voice, perspective, and form testify to the author's desire to challenge the limits of her perceptual strategies. They also place her squarely in her historical moment. Laura Dassow Walls explains that those in Fuller's Cambridge circle, especially Emerson and Henry David Thoreau, experienced a feeling of discontent that manifested itself as a "broad condemnation [that] was focused on the church, philosophy, science, the commercial and industrial economy, social disintegration," all topics that came under Fuller's critical eye during her western adventure.[6] Phelps and her brand of botanical education represented in many ways the kind of intellectual stasis that Fuller sought to escape during her trip to the frontier. Along with her fellow transcendentalists, Fuller was discontented with Lockean empirical philosophy and epistemology, especially because Fuller and others judged precisely the structure that Phelps admired for its liberating qualities as oppressive to viewers who sought more vital contact with the world. Phelps found in John Locke a useful strategy for employing the mind to process sensory data, a process that required the observer to engage the rational capacities of the mind. But Locke and his "sensation-based, skeptical philosophy" fell out of favor with those who argued that his mechanistic notion of perception did not allow for dynamism in sensory observation.[7] Fuller, for example, argued that individuals brought to the processing of sensory perceptions a unique set of experiences, expectations, and assumptions; thus, each individual's understanding of objects and words would differ slightly.

But the discomfort with the intellectual limits imposed by traditional epistemological and by extension scientific models not only was felt by

Fuller and her friends but also was being played out in larger social and scientific theaters, particularly in the transition from mechanistic to organic sciences. While Emerson was calling on his cohorts to transcend the limits of the physical senses and to extend the boundaries of both sensation and understanding as a means of comprehending the unity of nature, Asa Gray was encouraging students of botany to look beyond the limits of Carl Linnaeus's static classification systems and to comprehend the natural world as a complex web of interrelated elements. Romantic scientists such as Alexander von Humboldt and Goethe likewise rejected the fragmenting tendencies of Enlightenment models of science and urged individual observers to look for the underlying unity of natural systems, to seek "a unity of plan" that transcended mere atomistic considerations of function or form.[8] As Lisbet Koerner notes, the understanding sought by these figures "depended as much on a scientist's personal sympathy with nature as on his systematic study of it."[9]

Perception—how one observes and interprets the world—lay at the root of the dilemmas that occupied scientists and others in the early to mid-nineteenth century. Lockean empiricism had its advantages, which were certainly exploited, but by Fuller's time, the mechanistic observer of the Enlightenment had become a "caricature of the empirical drudge, accumulating mere facts," to use Walls's image.[10] Fuller's trip west was motivated by a desire to challenge the limits of her perceptual strategies: she sought a more vital, more participatory perceptual model. She hoped that an immersion into the spirit of the West, a place where definitions were continually rewritten, would propel her into new ways of seeing and experiencing the natural world. But the fact that Fuller constructed *Summer on the Lakes* months after her return home in the intellectual and physical enclosure of Harvard Library and at a distance from the vital landscape of her journey sheds light on the author's real difficulty in weaving the lived experience of her trip into the fabric of her everyday life.[11] *Summer on the Lakes*, with its defiance of conventions of form, structure, and content, becomes a kind of practical guide to individual perception. Fuller's difficult text finally leaves readers with an unanswered question: How does thought translate into action?

After returning home to Cambridge, Fuller contemplated recording the "poetic impressions" of her trip into a "little book."[12] This new, original project marked an important moment in the author's intellectual history,

falling between her publication of "The Great Lawsuit" in the *Dial* in 1843 and her expansion of that essay into her seminal text, *Woman in the Nineteenth Century* (1845).[13] Moreover, *Summer on the Lakes* appeared when Fuller was most dissatisfied with the brand of transcendental philosophy handed down by Emerson, especially the "language of masculine self-improvement" that characterized his vision of self-reliance, as Mark Vasquez argues. Vasquez notes that Fuller was increasingly turning to the idea of community as the "way to self-improvement" for women. A desire to strike a "practical balance between the needs of the one and the needs of the collective" characterizes Fuller's work during this period and is especially apparent in her discussion of the needs of women on the frontier in *Summer on the Lakes*.[14]

Fuller was also looking for a project that might prove commercially successful, and *Summer on the Lakes* capitalized on the interest in women's frontier narratives and travel fiction generated by writers such as Caroline Kirkland (*A New Home—Who'll Follow?* [1839] and *Forest Life* [1842]) and Harriet Martineau (*Retrospect of Western Travel* [1838] and *Society in America* [1837]). Susan Belasco Smith explains that Fuller "worked steadily on filling out her impressions" in the fall of 1843. Her desire to be "certain of her facts" led Fuller to the Harvard Library, whose considerable holdings served as the basis for her research. Significantly, Fuller was the first woman ever admitted into the library's halls.[15] The many travel narratives that Fuller read there—among them those by Frances Trollope and Martineau—enabled Fuller to comprehend her journey as a total experience, as an individual experience that nevertheless participated in a larger narrative of exploration and description.

As Fuller sat in the Harvard Library, she reconstructed her experiences from a distance, one that allowed her to see them in their proper context. Fuller's letters to friends back home written during the trip indicate that she could not achieve such understanding in the midst of her travels, as she complained of having "little inclination to communicate" her impressions of her trip at the time. To Channing she elaborated, "Ever since I have been [in Chicago], I have been unwilling to utter the hasty impressions of my mind. It has seemed that they might balance and correct one another till something of wisdom resulted. But that time has not come." And although she complained to Emerson that she was "silenced" by the people around her, she explained to Maria Rotch that she had "made scarce any record of

[the trip] with my instrument, the pen, for the days were so full of new impressions that there was not time left to tell of them."[16]

The slim volume that resulted from Fuller's meditations on her voyage is a rich, complex text composed not only of the author's observations of the scenes she encountered but also of extracts from other travelers' accounts, letters, poems, book reviews, translations, and short stories. The text has most often been identified as a travelogue or literary excursion, an "encyclopedic" form that related to her readers the physical as well as the intellectual and textual terrains covered by the author during her summer wanderings.[17] In reconstructing her experiences for her readers, Fuller resisted objectively rendering her trip and systematically reproducing the mundane details of her travels. Instead, she focused on its subjective aspects, on how specific objects in the landscape affected the imagination. This text, as many scholars have noted, cannot be easily read or classified as it refuses to adhere to narrative, perceptual, or aesthetic conventions.[18] Indeed, from the opening lines, Fuller frustrates any expectation that her representations of the scenes of her travels will conform to her audience's expectations. The first chapter, for example, begins simply with a place and a date, "Niagara, June 10, 1843," information that seemingly grounds the reader in space and time (*Summer*, 3). Yet the chapter that follows takes the reader not on a tour of the falls themselves but on an excursion through the multiple representations of the falls available to tourists. Niagara becomes an example of the American scene, a geographical feature defined and experienced in terms of its associative qualities.

Part of the difficulty in accessing *Summer on the Lakes* resides in the text's multiple and often competing or contradictory narrative voices. As Jeffrey Steele notes, Fuller "dramatizes the disharmony of available literary roles" for the woman traveler, and as she moves from place to place and chapter to chapter, she constructs various narrative personas, each of which is ultimately frustrated in her attempts to see accurately the scene. These personas include the seeker of the "sublime" who stands at the foot of Niagara Falls awaiting a transcendental moment; the genteel lady traveler who watches with amused aloofness the picturesque actions of American Indians and settlers on the frontier; and the professional reviewer and social critic who records the real and tragic life of displaced American tribes and poverty-stricken frontierspeople. Fuller, Steele argues, "found no simple posture that balanced the contradictions between these different roles. Each

provided a different experiential and conceptual framework that possessed obvious limitations."[19]

These multiple voices inhabit a text that tests structural limits as well. Fuller cautions her readers that her book will not conform to their expectations, a caution evident in the terms she uses to describe the volume: "such foot-notes as may be made on the pages of my life during this summer's wanderings" and a "thread" strung with "all these beads that take my fancy" (*Summer*, 1, 148). One bead might consist of a quoted passage from a renowned ethnologist, another a piece by an obscure poet, and another the author's description of a landscape. Yet in the manner of footnotes, the text neither promises nor provides a comprehensive, cohesive interpretation of the scene. It offers instead different possibilities for understanding the vistas presented. At times book review, at times existential meditation, *Summer on the Lakes* moves between the twin demands of the classical travel narrative form and of the romantic literary travelogue favored by American transcendentalists. Fuller at moments identifies quite closely with classical travel writers who avidly read and reported on a wide variety of travel accounts, often at the expense of really seeing a place for themselves.[20] As she moves across the landscape, she fleshes out the geographical outline of her journey by including appropriate selections from early pioneer, exploration, anthropological, and other scientific texts, and her book becomes a kaleidoscope of individual experiences, both hers and others', on the land. She appears to privilege bibliography over geography and seems determined to prove to her readers that she amply researched the territories she visited. Although the very constructedness of Fuller's text often seems to obscure any clear portrait of the places she visits, the seemingly extraneous textual selections, repeatedly excised from subsequent editions of *Summer on the Lakes*, are essential to understanding how Fuller comprehended the moral, historical, and cultural elements encoded in that landscape.

Fuller warns her readers that *Summer on the Lakes* should not be regarded as a "guide-book" that relates the "geography of the scene"; rather, she participates in the transcendentalist project and seeks to communicate the "poetic impression of the country at large" (*Summer*, 41–42). Nineteenth-century excursion and travel narratives detailed a transcendentalist's "spiritual autobiography" and, as Don Scheese writes, provided an "account of the growth and maturation of the self in interaction with the forces of the world."[21] In this way, Fuller's account was meant to chart

her transformative experiences with the land. But in Fuller's case, *growth* has multiple meanings. She grows in understanding when she recognizes that despite her wishes, she remains unable to transcend palpable limits, whether they are restrictions placed on her adventures by her gender or limits placed on her perceptual abilities by the very real damage she sees to both the land and the people she encounters. Just as Fuller's insistence on interpretative fiction in conjunction with empirical fact defies the conventions of the classical travel narrative, so her refusal to lose herself in spontaneous exaltations of the grandeur and sublimity of the landscape, as evidenced by her quiet reaction to the "spectacle" of Niagara Falls, challenges the expectations of those hoping to encounter an intensely expressive romantic excursion narrative.

Nevertheless—and despite her warnings—early readers of *Summer on the Lakes* expressed palpable disappointment. Emerson, who called the book a mere compilation of "vapid" observations, set the tone for much of the criticism that followed. In an oft-cited early review of *Summer on the Lakes*, Caleb Stetson complained that Fuller's writing "appears often strained, unnatural, out of place." "The intellect," he charged, "is too predominant" and reveals "overcarefulness and severity in a mind unwilling to trust to natural and simple impressions, and allow them to utter themselves in their own way."[22] Orestes Brownson offered even more direct criticism: "Her writings we do not like. We dislike them exceedingly. . . . She is ill at ease. She has no quiet, no repose. She has no faith, no hope."[23] These complaints, especially Stetson's, ring true in part because the tensions in the text between the structured and the spontaneous, the classical and the romantic, and the remote and the familiar make many of Fuller's descriptions and reactions seem forced and hollow. Although Fuller most likely felt the sting of her critics' charges, these criticisms obscured the important purpose that she imagined her text serving: the combination of textual selections and digressions together with the author's immediate impressions of the landscape surrounding her—a melding of fact and imagination—embodied the kind of self-cultivation and engagement that Fuller wanted to encourage in her readers. Readers were responsible for engaging with the compiled footnotes and for participating in the process of meaning making as part of interacting with the text. Fuller, then, was not, as Stetson argues, "out of place" in her writings of place. Rather, she tried to perceive for herself each place through the haze of writings about it.

In her quest for a method of cataloging her perceptions, she had years before turned to Goethe—specifically, to his major scientific text, the three-volume *Farbenlehre* (*Theory of Colors*, 1810). In 1841, Fuller sent a brief yet subtly powerful note to Channing:

> I have been reading, most of the day, the "Farbenlehre." The facts interest me only in their mystical significance. As of the colors demanding one another in the chromatic circle, each demanding its opposite, and the eye making the opposite of that it once possessed. . . . Of the cochineal making mordants to fix its dye on the vegetables where it nestles. Of the plants which, though they grow in the dark, only make long shoots, and refuse to seek their flower. There was a time when one such fact would have made my day brilliant with thought. But now I seek the divine rather in Love than law.[24]

In *Theory of Colors*, Goethe investigated the "primordial" phenomena of color and argued that the perception of color is an intensely emotional experience that unites the eye and mind; in so doing, he bridged the gap between the mechanistic and romantic observer positions in scientific studies. The model of nature that Fuller read in Goethe's *Theory of Colors* privileged unity and order—each color demands its opposite consistently and across a variety of instances. As Goethe writes, "We before stated that the eye could be in some degree pathologically affected by being long confined to a single color. . . . We now observe that the demand for completeness . . . frees us from this restraint; the eye relieves itself by producing the opposite of the single color forced upon it, and thus attains the entire impression which is so satisfactory to it."[25] This harmony of opposites represented precisely the balance that Fuller hoped to achieve in her discussions of beauty and utility in the American landscape. Goethe provided Fuller with what she so desperately needed in 1841—that is, the tools by which to unite perception and interpretation, experience and intuition, "law" and "love." Goethe, like Humboldt, saw the natural world as a harmonious space arranged according to a divine plan. But nature was also organic and dynamic: the attentive observer, with a clear perceptual model/plan, could apprehend both order and dynamism. Nature, according to Goethe, "is a living unity, in which mind and matter are inextricably linked."[26]

Goethe addresses both the role of the individual observer and the harmony of opposites in *Theory of Colors*. He argues for the purity of white

light against Newtonian spectral color theory, which argued that light consists of seven simple, "uncompounded" colors created by refracting light though a prism.[27] Newton argued further for the immutability of these uncompounded colors, charging that anyone who performed his experiments according to his specifications would achieve the same results. Newton's model omitted the presence of most importance to Goethe and later to Fuller: the individual observer. In Goethe's model, the observer brings to any experiment or observation on color phenomena a unique physical and psychological perspective. In his hundreds of experiments with light and prisms, Goethe insisted on "color's transient unfolding within the human subject," as Jonathan Crary explains.[28] According to Neil Ribe and Friedrich Steinle, Goethe recognized "that the human eye and the external world constitute a complex interactive system," and his hundreds of experiments resulted in "a deeper understanding of the complexity of the conditions under which colors appear in the world of everyday experience."[29] Crary observes that Goethe's revolutionary model of subjective vision united two perceptual models that were generally regarded as "distinct and irreconcilable": the physiological observer, who simply processes the facts of the natural world and places them into a logical order, and the romantic observer, who actively produces his or her individual visual experience.[30] Goethe yoked scientific inquiry to real states, making the experience of something the primary determinant in understanding that object. This approach resonated with Fuller, who sought to bind her understanding of both nature and nation to her experience of them.

Fuller's voyage to perceptual accuracy and aesthetic transcendence is born, appropriately, in the cradle of the American sublime, Niagara Falls. The scene Fuller witnesses while approaching the falls assaults her unpracticed senses and threatens to overwhelm her: "My nerves, too much braced up by such an atmosphere, do not well bear the continual stress of sight and sound. For here there is no escape from the weight of a perpetual creation; all other forms and motions come and go, the tide rises and recedes, the wind, at its mightiest, moves in gales and gusts, but here is really an incessant, an indefatigable motion. Awake or asleep, there is no escape, still this rushing round you and through you" (*Summer*, 1). Fuller, like other visitors to this magnificent locale, comes prepared to praise the marvels of untrammeled nature—the "perpetual creation" of the American scene at its most potent and vibrant. Her sensory overload is a natural mecha-

nism that evokes a proper response: "It is in this way I have most felt the grandeur—somewhat eternal, if not infinite" (*Summer*, 1). But Fuller's response is qualified. The rushing of the cataract is ultimately temporal, a function of a limited time and space: "somewhat eternal" and "not infinite." Looking at the falls, Fuller sees a grand landscape that has lost its transcendental potential in the crush of tourist and mercantile industries crowding the cataract.

Although Fuller claims that her "nerves . . . do not well bear" the constant pressures of Niagara Falls, the reader soon begins to sense that what Fuller's nerves can in reality no longer tolerate is the abundant representations of the feelings Niagara is supposed to engender in the attentive observer (see figure 3). The descriptions, guidebooks, advertisements, drawings, paintings, panoramas, "&c" that assault Niagara tourists have given her "a clear notion of the position and proportions of all objects here; I knew where to look for everything, and everything looked as I thought it would." She adds, "It looks really *well enough*" (*Summer*, 4). Fuller even chides herself for feeling nothing but a mild disappointment when, while looking at the falls, she thinks "only of comparing the effect on my mind with what I had read and heard" (*Summer*, 8). She has plenty of examples from which to draw. In 1835, Nathaniel Hawthorne recalled his belated visit to Niagara: "Blessed were the wanderers of old, who heard its deep river sounding though the woods, as the summons to an unknown wonder, and approached its awful brink, in all the freshness of feeling."[31] Alexis de Tocqueville, in his incisive analysis of the American scene, warned, "If you wish to see this place in its grandeur, hasten. If you delay, your Niagara will have been spoiled for you. Already the forest round is being cleared. . . . I don't give the Americans ten years to establish a saw or flour mill at the base of the cataract."[32] Fuller's cynicism in this passage is easily apparent: even her disappointment was predetermined, and her complaint intentionally echoes the sentiments of these other noted travelers. As she writes, "Happy were the first discoverers of Niagara, those who could come unawares upon this view and upon that, whose feelings were entirely their own" (*Summer*, 9).

As this opening passage demonstrates, *Summer on the Lakes* concerns the process of coming to understand the actual and imaginative potential of both the individual and the communal in the American scene. Goethe's appeal for Fuller in this context becomes manifest in the opening lines of

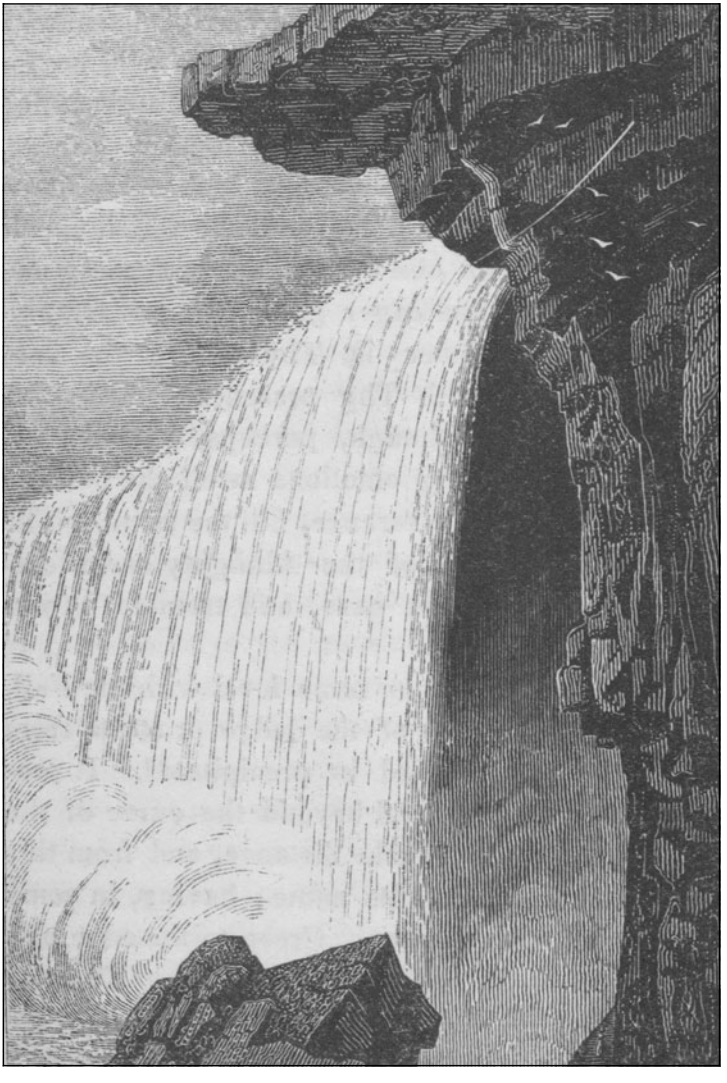


FIGURE 3. Table Rock from Below, by J. W. Orr, circa 1842. C. D. Ferris's *Pictorial Guide to the Falls of Niagara: A Manual for Visitors, Giving an Account of the Stupendous Natural Wonder, and All the Objects of Curiosity in Its Vicinity, with Every Historical Incident of Interest and Also Full Directions for Visiting the Cataract and Its Neighboring Scenes, Illustrated by Numerous Maps, Charts, and Engravings, from Original Surveys and Designs*, from which this image is drawn, is an example of the kind of guidebook to which Fuller refers in *Summer on the Lakes*. Milstein Division of United States History, Local History and Genealogy, the New York Public Library, Astor, Lenox, and Tilden Foundations.

the *Theory of Colors*, in which the author in part accounts for the origins of his interest in optics by making a general statement on epistemology:

> The desire for knowledge is first stimulated in us when *remarkable phenomena* attract our attention. In order that this attention be continued, it is necessary that we should feel some interest in exercising it, and thus by degrees we become better acquainted with the object of our curiosity. During this process of observation we remark at first only a vast variety which presses indiscriminately on our view; we are forced to separate, to distinguish, and again to combine; by which means a certain order arises which admits of being surveyed with more or less satisfaction. (xxxvii)

This passage demonstrates the ways in which Goethe sought to move beyond the perceptual strategies of Enlightenment scientists and philosophers such as Isaac Newton, Linnaeus, and Locke—and between Fuller's apprehension of the natural world and Phelps's. Goethe's notion of perception, like Locke's, relies on sensation, on a "vast variety which *presses* indiscriminately *on our view*," yet in Goethe's case, the action of perceiving is not passive or automatic: the "desire for knowledge" is stimulated only when "*remarkable phenomena* attract our attention." In Locke's view, the process of receiving sensations is passive, an automatic result of existence. Locke's systematic model guarantees a certain level of objectivity in knowledge: "Some sorts of truths result from any *ideas*, as soon as the mind puts them into propositions."[33] Knowledge of "truth"—objective truth—is a happy consequence of experience and understanding. These easily observable truths were precisely what made Locke so appealing to Phelps, as the same truths were revealed to each and any individual observer.

The opening of *Theory of Colors* clearly demonstrates that Goethe was concerned with demonstrating the "process of observation" that his new subjective vision enabled. In his intensive investigations into optical phenomena, Goethe challenged the limitations of the mechanistic model that Newton imposed on optical theory and took issue with Newton's methods as well as his conclusions. As Alexander Rueger notes, Goethe's scientific approach differed from that of Newton, who merely "chose from the ocean of possible and available phenomena those particular observations and experiments that could support his hypothesis or could help decide against competing views."[34] Newton, Goethe implied, knew in advance what he was trying to prove: gravity, for example, was an accepted principle, and

he was merely trying to extend the understanding of that phenomenon. Goethe sought instead a different model of scientific investigation, one that Ribe and Steinle call "exploratory experimentation." For Goethe, this "experimental procedure comprised two stages: an analytic one that moved from complex appearances through simpler ones to a first principle, and a synthetic stage that moved in reverse order, showing how more complex appearances are related to the first principle."[35]

The observer begins by assuming that nature is governed by underlying principles, but those principles are as yet unknown. Recording his experiments in optics allowed Goethe to examine how the individual both perceives and records and then explicates that perception. Accordingly, each individual would "separate," "distinguish," and "again . . . combine" the "vast variety" according to his or her "curiosity." The ideal observer would watch with an open mind, recording all "deeds" and "actions" performed by the object under investigation and beginning to construct a narrative—"a complete record" of the "inner nature" of a thing—only after sufficient and significant experience of the object (*Colors*, xxxvii–xxxix). The *Theory of Colors*, for example, presented Goethe's account of his experiences with the "remarkable phenomena" of light, a "narrative" that Rueger describes as "an account of light which proceeds through the telling of the stories that light enters. . . . The totality of all the true stories about light would be the complete theory of light." Goethe's model was active and participatory and attempted to "arrange the phenomena in their most *natural order*." This natural order, Goethe argued, would then reveal the "true underlying principles" that govern nature.[36]

Guided by this model, Fuller seeks to comprehend, as a narrative, the "new order" emerging from the chaotic American space, and her method of collecting evidence and establishing her hypotheses about the burgeoning nation adheres to the principles Goethe established in his text. Fuller seeks experience in her summer excursions, and Goethe provides her with an effective formula that enables her to develop a way of seeing, reproducing, and recording her experiences on the frontier—what Mary-Jo Haronian calls a "poetics of perception."[37] Goethe shows Fuller how to engage her sensory apparatus and confront the landscapes and vistas that can propel her out of the "superficialness of [her] life" and transform her way of interacting with the world around her.[38] Haronian, however, also argues that "Fuller avoids the sort of quandary Goethe manifests [the search for

a true narrative] because she is less interested in whether different colors, images, or representations are consistent or true than in how they attain their significatory functions and how these functions can be altered."[39] This statement certainly holds true for Fuller's individual investigations into the mechanics of perception, but it is not necessarily true of her textual investigations of the American scene, as *Summer on the Lakes* records Fuller's attempts to search for the "true" narrative of American developments. In light of Goethe's recommendations, the seemingly difficult structure of *Summer on the Lakes* becomes clarified: the excerpts and the borrowed pieces, the journal entries and the sketches—the stories of the American scene—together create the true narrative of that scene.

Goethe argued that knowledge based on accurate, analytical observation is difficult to obtain and "requires an unremitting and close application." As a result of this difficulty, he contended, "men prefer substituting a general theoretical view . . . for the facts themselves, instead of taking the trouble to make themselves first acquainted with cases in detail and then constructing a whole" (*Colors*, xxxvii). These terms, for example, can explain Phelps's reluctance to commit her students to the "unremitting" study required by the complex natural systems of botany and her reliance instead on Linnaeus's more general classification system. These phenomena can also help to explain Fuller's complicated experience of both Niagara Falls and later the prairies and open spaces of the West. As noted, Fuller failed to realize the sublime rapture typically associated with a tourist's first view of the falls. The sublime landscape, according to Edmund Burke, should astonish the observer: "The mind is so entirely filled with its object that it cannot entertain any other, nor reason on that object which fills it."[40] The sensation of the sublime, according to Barbara Novak, "provoked intimations of . . . an overwhelming divinity, dwarfing the observer who, though he had aspired to transcendence, rarely forgot his own insignificance."[41] The magnitude of the object in front of the viewer was so great as to overwhelm the observer with terror and fear. Immanuel Kant argued that the sublime spectacle inspired pleasure as well as fear: fear of one's insignificance was coupled with the pleasure derived from the individual's reasoning powers or from the mind's ability to legislate sense experience.

Jeffrey Steele, Christina Zwarg, and others argue that Fuller's repudiation of the narrative of the sublime derived from her understanding of

the sublime experience as expressing a typically masculine narrative of fear, abjection, and finally transcendence in the face of an overpowering scene. Zwarg argues that Fuller's experience at the falls, during which she has a vision of herself as a "vulnerable maiden" threatened by ferocious Indians, disrupts the "Kantian dynamic" of fear and pleasure that comprises the sublime experience. Furthermore, Fuller "experienced the blockage usually affiliated with Kant's mathematical sublime as she stood before natural might of the Falls, but little of the compensatory pleasure that Kant predicted would emerge from such a challenge."[42] As Steele notes, women writers, "conditioned to view themselves in passive terms and cut off from these cultural identifications[,] . . . frequently found such psychological ravishment deeply disturbing."[43] While it is true that her culture's restrictive gender categories rendered the conventionally sublime experience meaningless for Fuller, she nevertheless configures her encounters first with the falls and later with the prairie as an aesthetic experience akin to the sublime. However, her aesthetic experience is not conventionally scripted and instead complements her Goethean perceptual strategy, which defines aesthetic experience as the convergence of "idea" and "experience" mediated by "imagination."

Goethe assures Fuller that "nature tends to emancipate the sense from confined impressions by suggesting and producing the whole, and that in this instance, we have a natural phenomenon immediately applicable to aesthetic purposes" (*Colors*, 319–20). Thus, although Fuller feels "nothing but a quiet satisfaction" at her "proper" response to Niagara, her grievances about the representations of Niagara (*Summer*, 4) recall the passage that opens the *Theory of Colors*. She complains, in these introductory comments on Niagara Falls, that "so great a sight soon satisfies" (*Summer*, 1), but she also discovers, true to Goethe's promise, that the meaning of the object before her becomes explicit when she gives the sight time to settle into her mind's eye: "But all great expressions," she determines, "which, on a superficial survey, seems so easy as well as so simple, furnishes, *after a while*, to the faithful observer its own standard by which to appreciate it" (*Summer*, 4; emphasis added). During her trip, Fuller finds this promise fulfilled, as she discovers that "daily these proportions widened and towered more and more upon my sight, and I got at last, a proper foreground for these sublime distances" (*Summer*, 4). Fuller ends her description of her reaction to Niagara only when she can acknowledge that all "tended to harmonize

with the natural grandeur of the scene" (*Summer*, 9). She "gaze[s] long," as Goethe recommends, and finds harmony in the coordination of dissimilar parts, finds "mutability and unchangeableness . . . united" (*Summer*, 9).

Fuller, initially disappointed by her tepid response to the great prospect before her, is aware that every vista, no matter how seemingly "imperturbable," possesses a "hidden vortex [that seems] to whisper mysteries the thundering voice above could not proclaim." As a patient, reverent observer, Fuller knows that as she looks at the water, "whatever has been swallowed by the cataract, is like to rise suddenly to light," just as the superficial aspects of the scene disappear and the deeper meaning rises to the surface (*Summer*, 5). She frequently reminds readers that just as "colors [demand] one another" progressively in the chromatic circle, so she could not "woo the mighty meaning of the scene" at first glimpse (*Summer*, 18). As she moves west, her eye becomes more practiced, and on the prairie, it is stimulated by other "remarkable phenomena," although the simple objects—the flowers and clouds and cattle—that inspire her are not as grand as such sights as the Niagara cataract. As Fuller watches the sun set over the limitless prairies, she finally experiences the Kantian pleasure denied her at Niagara. Her "reason" overtakes her "fear": "I began to love because I began to know the scene, and shrank no longer from 'the encircling vastness' " (*Summer*, 22). Fuller writes that both her "eye" and her "mind" have become accustomed to the scene before her, but she reminds herself of Goethe's recommendation: she must learn to "separate, to distinguish, and again to combine" the "vast variety" of objects that first press "indiscriminately into view" (*Colors*, xxxvii). After doing so, she can see "the meaning of the flower uprooted in the ploughed field," like the poet, "who sees that field in its relations with the universe" (*Summer*, 79).

Goethe's *Theory of Colors* enables Fuller to define how the spiritual and emotional work in concert with the rational and empirical in perception. Goethe teaches her (literally) how to see the natural world as a series of objects that impinge on the visual sense and leave their impressions in both the muscular (objective) and imaginative (subjective) memory. For Goethe, this convergence of experience and idea, of sensation, rationality, and imagination (feeling), forms the basis of aesthetic perception. As R. H. Stephenson explains, this aesthetic perception "yields the most comprehensive knowledge humanly available" and functions as "the norm against which all other kinds of knowing must be adjudged."[44] Individuals can rely

on their sensory apparatuses to provide an "objective" record of the impressions received, and perception becomes an active process that requires observers to engage with the objects observed.

As opposed to Lockean perceptual strategies, which tell the same narrative to different observers, perception in Goethe's model is essentially subjective since each object leaves different impressions on different eyes. Fuller's western journey provided her an opportunity to test which perceptual modes could be best adapted for the American frontier (the sublime, the picturesque, the mechanistic, the Romantic), and she brings her experiences and emotions to bear on the process of observing the American landscape.

During her trip to the Great Lakes, Fuller's interpretative "I"/"eye" is everywhere; indeed, words related to sight abound in the text: in Cleveland, she watches as "a new creation takes place beneath the eye" (*Summer*, 12); at Mackinaw, she writes, "From my window . . . my eye was constantly attracted by these picturesque groups. I was never tired of seeing the canoes come in" (*Summer*, 108); at dawn in Sault Ste. Marie, she regards the riverbank that had been obscured the preceding evening and exclaims, "I had not seen all the night before; it came upon me with such power in its dewy freshness!" (*Summer*, 150). Fuller makes clear from the opening pages of *Summer on the Lakes* that the development of this individual "I"/"eye" is the essential first step in fashioning an appropriate response to the American scene. A well-trained eye and a supple mind—clear sight, combined with careful contemplation of the view presented to the eye—is necessary to understand how the landscape will best be used. As the individual looks out over the land, the connections between human and human, and human and nonhuman, come into relief. The land reads as a moral geography, a space held together by moral links that extend outward from the individual to the community and from the community to the land. Action follows perception, and the observer who sees the people and the land properly will follow the best course of action in developing that land. In a sense, Fuller's course of action was to write *Summer on the Lakes*, for in it, her "I"/"eye" serves a communal purpose and enables her accurately to describe to the American nation its progress in relation to its use of its landscape.

Fuller concluded, as she indicated in a letter to Channing, that only "the botanist, the geologist, the poet" had been properly trained to "really see" the potential of the American landscape and nation.[45] That Fuller

privileged the observer stance of both the scientist and the poet, a position happily occupied by Goethe, is notable, especially because Fuller was not known for her affinity for seeing the natural world as an object of her own scientific inquiry. Many of Fuller's closest friends complained of her lack of detailed knowledge of nature. Her noted aversion to particulars prompted Emerson to chastise her posthumously in his edition of her *Memoirs*: "Margaret's love of beauty made her, of course, a votary of nature, but rather for pleasurable excitement than with a deep poetic feeling. Her imperfect vision and her bad health were serious impediments to intimacy with woods and rivers. She had never paid,—and it is a little remarkable,—any attention to natural sciences. She neither botanized, nor geologized, nor dissected."[46] It is also possible that Fuller simply never responded to nature in the very masculine way that Emerson did—as something to be used and put underfoot by man. Nevertheless, Fuller's comment to Channing shows that she did recognize the enormous value of the methods of scientific investigation as they related both to accuracy in perception and to the ability to relate what is seen to the larger patterns of the universe. As a poet, Fuller refused to restrict her imagination by imposing on it the limiting terminology of science, with its taxonomy and classification, and she generally resisted naming the plants, trees, and animals whose paths she crossed. Instead, she opted to leave that task for those more suited to it.

Fuller did, however, want to possess a deep understanding of the world around her. Accordingly, *Summer on the Lakes* became the vehicle through which Fuller tested Goethe's notion that the reproduction of experience was essential for understanding that experience. This testing played itself out in the construction of the text, as *Summer on the Lakes* both recorded her journey on the plains and reproduced her journey to knowledge. Without active reproduction, items viewed made no impact on the senses. Fuller had long believed that reproduction was the only means by which intellectual growth could occur. As she wrote in her *Memoirs*, "Women are now taught, at school, all that men are; they run over, superficially, even *more* studies, without being really taught anything. . . . But, with this difference; men are called on, from a very early period, to reproduce all that they learn. . . . But women learn without any attempt to reproduce. Their only reproduction is for purposes of display."[47] Her Boston Conversations for Women (1839–44), a series of talks and discussions by and for women on various intellectual topics, were motivated in part by a desire to provide

women with a forum in which they could productively use the information they learned. *Summer on the Lakes* can also be read as a conversation, as a living document that stands as an intensely personal account of the growth and maturation of her perceptual abilities. She wanted her audience to engage with and not simply admire (or dismiss) her account of the landscape and the nation. Fuller's use of the dialogue form, transformed now into a conversation, converted that otherwise intellectually vacant mode into an engaging, mentally stimulating form. In her efforts to engage her pupils' minds, Fuller shared in the intellectual concerns of nineteenth-century female educational reformers, who strenuously argued for a program of education that married observation and experience. Phelps, of course, shared this view and sent her students of botany outside, locating in their natural habitat the plants studied in the classroom.

The reproduction both of the scenes Fuller witnessed and of the texts she read clearly enabled her to know rather than simply see the scenes she encountered, and her text became if not a guidebook to a place then a guidebook to knowledge. The importance of reproduction in Fuller's thinking is the key to unlocking the strategy of the structure of *Summer on the Lakes*. Fuller's observations—her "foot-notes"—do not follow either geographical or temporal logic; rather, as Stephen Adams notes, she organizes her text around "the wider theme of an ideal junction of opposites," a concept derived directly from her reading of Goethe.[48] Like the natural world that it examines, *Summer on the Lakes* operates according to underlying principles, but the individual reader must discover them. Fuller's approach to her text as mapping the frontier of knowledge mirrors her understanding of nature as frontier, an as-yet-unknown but ultimately knowable space.

Remembering Goethe's dictate to fuse fact and imagination, Fuller writes that the textual selections that accompany her portraits help to make those places more "real." While waiting for the stagecoach that will take her party out onto the prairie near Chicago, for example, Fuller writes, "Since circumstances made it necessary for me to do so, I read all the books I could find about the new region, which now began to become real to me" (*Summer*, 19). Fuller provides her readers with a lengthy annotated bibliography that details a rich selection of travel and tour books, prairie mythologies, and anthropological studies of the local American Indian tribes. Fuller's reading of these authoritative texts can be likened to Goethe's reading of Newton's optical theory. Just as Goethe sought to complicate the absolute

values that Newton assigned to colors, Fuller displaces the absolute values that these texts assign to indigenous cultures. She employs a brand of "exploratory experimentation" and submits these texts to an investigatory process that includes as a key component her observations and experiences, both real and imaginary, with American Indian tribes. Thus, Fuller only seems to substitute her observations of the people and places she has witnessed by including lengthy excerpts of accounts by other travelers; in fact, Fuller emends these texts to make them conform to her views. For example, she immediately qualifies her approving comment that "Catlin's book" on Plains Indians "is far the best" by asserting that "he is not to be depended on for the accuracy of his facts" (*Summer*, 20). The same holds true for "Murray's travels," which Fuller finds charming "by their accuracy and clear tone."[49] But Fuller disagrees with Murray's description of the Pawnees, writing, "The Pawnees, no doubt, are such as he describes them, filthy in their habits, and treacherous in their character; but some would have seen, and seen truly, more beauty and dignity than he does with all his manliness and fairness of mind" (*Summer*, 20). Washington Irving also comes under Fuller's careful scrutiny: "Though the books are pleasing from their grace and luminous arrangement, yet . . . they have a stereotyped, second-hand air. . . . His scenery is only fit to be glanced at from dioramic distance; his Indians are academic figures only" (*Summer*, 21).

The chosen selections exhibit Fuller's vexed relationship with her source texts, and her seemingly simple statement that these locales became "real" to her as a result of her reading becomes more complicated. Did the landscape become real because her reading had taught her factual information about the locale and its inhabitants? Or did the combination of reading (intellect) and sight (experience) work on her imagination and enable her to produce a new understanding of the place? Fuller's personal narrative, which embraces her readers as her friends, celebrates her observations and imaginative interpretations of the landscapes that she traverses. It records her efforts to establish an "original relation," as Emerson demands, not only with the land but also with the nation and the nation's history. Thus, after Fuller's long and careful recording of her source texts, she welcomes readers into the "religion [of] the scene," and her analysis recalls her reliance on Goethe: "In Chicago I first saw the beautiful prairie flowers. . . . Beside these brilliant flowers . . . stimulated, whether sensuously by the optic nerve, unused to so much gold and crimson with such tender green, or

symbolically through some meaning dimly seen in the flowers, I enjoyed a sort of fairyland exultation never felt before, and the first drive amid the flowers gave me anticipation of the beauty of the prairies" (*Summer*, 21). Fuller rewards her reader with this "fairyland exultation" only after she has placed that experience in a larger literary, historical, and imaginative interpretative framework.

During her summer excursion, Fuller searches for experience—of landscapes, people, cultures, and languages. In experience, she seeks to reproduce what she has learned from her reading, whether it is the excitement of a canoe voyage to Lake Superior or that of "camping out at night beneath the stars" (*Summer*, 148). Fuller's insistence on reproduction hearkens directly back to interactions with her transcendentalist cohort and the concept of self-culture that permeated their conversations. As Gregory Clark and S. Michael Halloran note, the nineteenth-century notion of self-culture derived from the epistemological shifts inspired by René Descartes and John Locke, who based knowledge in individual experience rather than institutional authority. Clark and Halloran argue that Emerson and later Fuller and other transcendentalists extended the epistemological frameworks of Locke and Descartes, making "absolute spiritual truths accessible to individual perception alone."[50] This individualism translates into "self-culture," which Lawrence Buell defines as the "total growth of one's intellectual-moral-spiritual faculties," or life examined and lived, self-consciously, as art.[51] Goethe's description of the epistemological process and the model of perception that result complemented this view of self-culture and gave Fuller the tools she needed to effect her "total growth."

Fuller, of course, was not alone in her battle between rationality and imagination, between empiricism and mysticism. And although Goethe offered Fuller a model according to which she could structure her perception of the natural world, she resisted relying on that formula to determine the meaning of those perceptions. As Buell discusses, the general drift of the transcendentalist group with which Fuller (at times) identified arose as "renegade Unitarians" sought to infuse Unitarian rationalism with Romantic mysticism. They wanted to make direct experience of the holy more important than an understanding of it based on empirical study of historical and natural evidence.[52] As a transcendentalist, Fuller sought "to strike a balance between rational inquiry into the world outside of [her] skin, and emotional sympathy with the life that permeates and unifies inside and

outside, subject and object."[53] *Summer on the Lakes* chronicles the urge to achieve this balance—specifically, in the dialogue that Fuller constructed among Old Church, Good Sense, Self-Poise, and Free Hope in a section following her description of her return to Milwaukee at the midpoint of her trip.

Fuller wrote the dialogue as a way to express her "own mental position" on a biography that she read in Milwaukee. *The Seeress of Prevorst* tells the story of Frederica Hauffe, a young woman with a "peculiar inner life" who was raised in a mountain hamlet in Germany (*Summer*, 83). Hauffe, Fuller informs her readers, was a "lively and blooming" girl who led a rich, active, outdoor life until an unhappy marriage forced her to move to a "gloomy" place, "shut in by hills" (*Summer*, 85). Fuller's affinity for Hauffe is obvious from the fact that almost one-third of *Summer on the Lakes* retells her story and from the tone of the dialogue that precedes this material. Not surprisingly, the *Seeress of Prevorst* section, with its clairvoyant, somnambulistic heroine with "electrical susceptibility" (*Summer*, 85), was long regarded as one of the most egregious textual digressions in which Fuller indulged and was repeatedly excised from the text. In the dialogue that introduces the story, Old Church, Self-Poise, and Good Sense caution the spirited Free Hope (with whom Fuller identified most closely) to keep her passions in check and to resist her visionary impulses. Free Hope, however, fiercely defends the virtues of the "pressure of hidden causes" (*Summer*, 79), of the supernatural and universal, of the visionary and the emotional, in the face of her fellows' more cautionary stances.

Emerson's poet, who appears as Good Sense, cautions Free Hope, "Let us be completely natural, before we trouble ourselves with the supernatural. I never see any of these things but I long to get away and lie under a green tree and let the wind blow on me. There is marvel and charm enough in that for me" (*Summer*, 79). Free Hope compliments Good Sense on his calm response to the natural world, as Fuller did Emerson, yet Fuller insists that Free Hope is more expansive than her "liberal" but still limited friend. Free Hope states that, subject as she is to "the sudden revelations, the breaks in habitual existence caused by . . . the touch of love, the flood of music," she "has never lived . . . what you call a common natural day." She continues, "All my days are touched by the supernatural, for I feel the pressure of hidden causes" (*Summer*, 79). As Joy Rouse notes, "Fuller's transcendentalist companions grew increasingly frustrated with her tendency to make

connections between intellectual ideas and practices and life—to build the life of thought upon the life of action."[54] As Free Hope says, "What is done interests me more than what is thought and supposed" (*Summer*, 81). The poet, according to Emerson, "subordinat[es] nature for the purposes of expression," and imagination becomes a tool of reason, or "the use which the Reason makes of the material world."[55] In the models that both Good Sense and Self-Poise promote, experience provides its own rewards.

The apparent causes of Fuller's frustration with the limits Emerson placed on the possible ways of knowing become manifest in light of the ways the two authors viewed the value of travel. Fuller joyfully anticipated what might result from seeing new lands; in contrast, Emerson admonished in "Self-Reliance," "Travelling is a fool's paradise. . . . Our minds travel when our bodies are forced to stay home."[56] In *Summer on the Lakes*, Self-Poise (also a thinly disguised Emerson) chastises Free Hope and recommends that she "sit at home and the spirit-world will look in at your window with moonlit eyes; run out to find it, and rainbow and golden cup will have vanished and left you the beggarly child you were" (*Summer*, 81). Self-Poise advocates here a patient, reverent, and detached observation of particulars, a kind of perceptual strategy that Free Hope mocks in her desire for activity and motion. She responds to Self-Poise's tempered advice with a challenge: "I had rather walk myself through all kinds of places, even at the risk of being robbed in the forest, half drowned at the ford, and covered with dust in the street" (*Summer*, 81–82).

Fuller seeks to construct in Free Hope the intuitive observer she wants to be during her summer journey. In other sections of *Summer on the Lakes*, Fuller writes of the longing to feel the thrill of pure experience—of a canoe trip through dangerous rapids or a drive over untracked land. She represents the difficulties of uniting experience and imagination by telling readers that her wishes are routinely stymied: of her long-anticipated canoe trip, Fuller complains, "But I shall not enter into that truly wild and free region; shall not have the canoe voyage, whose daily adventure, with the camping out at night beneath the stars, would have given an interlude of such value to my existence. I shall not see the Pictured Rocks, their chapels and urns. It did not depend on me; it never has, whether such things shall be done or not" (*Summer*, 148). The gender dimensions of Fuller's melancholic laments cannot be ignored; indeed, the limitations that she so keenly felt on her trip echo the reasons for her ambivalence about participating fully in

the "Transcendentalist party." In an 1840 letter to Channing, Fuller freely acknowledged that she "sympathize[d] with what is called the 'Transcendentalist party,' and that [she felt] their aim to be a true one." However, in the overtly political yet modestly self-deprecatory style typical of Fuller, she qualified her association with the transcendentalists: "My position as a woman, and the many private duties which have filled my life, have prevented my thinking deeply on several of the great subjects which these friends have at heart. I suppose, if ever I become capable of judging, I shall differ from most of them on important points. But I am not afraid to trust any who are true, and in intent noble, with their own course nor to aid in enabling them to express their thoughts, whether I coincide with them or not."[57]

For a variety of reasons, Fuller could not participate fully in the grand adventures promised by her trip, just as she could not fully participate in the transcendentalists' intellectual program. But in Free Hope she creates a figure that can transcend the restrictions experienced by the author. As Free Hope she declares, "I would beat with the living heart of the world, and understand all the moods, even the fancies or fantasies of nature" (*Summer*, 82). Free Hope can take the facts that Fuller discovers through her observation and research and extract their metamorphic and nutritive qualities: "Every fact is impure, but every fact contains in it the juices of life. Every fact is a clod, from which may grow an amaranth or a palm" (*Summer*, 81). As this example indicates, Free Hope even reads the sentimental flower books that Fuller elsewhere claims to despise: Frances Sargent Osgood's enormously popular floral dictionary, *The Poetry of Flowers*, defines *amaranth* as "immortality" and *palm* as "victory," flower meanings that aptly inform Fuller's conception of fact.[58] Finally, Free Hope defies the authority figures who threaten her freedom as she seeks out her own imaginative terrain. She stands up to Self-Poise, flatly stating, "As it is, I must at times deny and oppose you, and so must others, for you tend, by your influence, to exclude us from our full, free life" (*Summer*, 82). Fuller, however, is not Free Hope. Despite her exuberance, Fuller remains bounded by Old Church, Self-Poise, and Good Sense; by law; by rationality; and by the texts and figures to which she defers in her representations of the natural world. For Fuller, this disjuncture between love and law, between the mystical and the rational, lies at the heart of the perceptual dilemma that governs the representation of the natural world in this text.

For all his concern with the organic and the dynamic, Goethe presented to Fuller a formulaic mode of cataloging her perceptions. He gave her order and a utilitarian way of perceiving the landscape that unlocked the beauty in that landscape. He gave her a method that could be utilized in a variety of circumstances. Despite its usefulness, this mode remained limited by its formulaic nature—by the colors that demanded one another in a fixed chromatic circle. This demand left little room for the intuitive, for the "supernatural," for the "pressure of hidden causes" for which Fuller wanted to account in *Summer*. As her letter to Channing demonstrates, the "facts" of perception that she gleaned from the *Theory of Colors* interested her "only in their mystical significance," and she could not resolve the problem between love and law with Goethe alone. Facts had to exist in conjunction with imagination, and, as Fuller shows in her representations of frontier settlers and settlements, utility must exist in concert with beauty.

Niagara Falls, then, as grand as it is, forms but one piece in the larger puzzle of the American scene. It marks only the beginning of Fuller's journey to perceptual accuracy, setting the stage for the discussions of utility and beauty, nature and nation, that dominate the presentation of the American landscape in *Summer on the Lakes*. Fuller seeks, as she states in *Summer*, "to woo the mighty meaning of the scene, perhaps to foresee the law by which a new order, a new poetry is to be evoked from this chaos" (*Summer*, 18). To define this new order, Fuller turns away from the obvious grandeur of the roaring cataract and instead seeks out the "accidental beauty" present in the Niagara locale—the rapids, the little waterfalls, and the fountains—and later in the rocks, plants, and grasses of the prairie. In short, she searches for those places that have not been obscured by the masses' "general theoretical view." She seeks to find those places where nature is a "work in progress," in Eric Wilson's words.[59] America, as she discovers, is a nation tied to its geography, and interspersed with the pictures of nature as a work in progress arise scenes of America as a culture in progress.

If nature is a sketch artist, creating "a study for some larger design," so Niagara too, with both its grandeur and tawdriness, appears a study for the larger design of the American nation (*Summer*, 5). Although sublime vistas often lead viewers directly to contemplations of divine majesty, Fuller's failed sublime reaction to the falls leads her directly into considerations of the national story recorded in the Niagara landscape. Standing next to the

cataract, Fuller writes, the "perpetual trampling of the waters seized my senses." But instead of being transported heavenward, Fuller's thoughts are directed back into the dim world of the American past: "I felt that no other sound, however near, could be heard, and would start to look behind me for a foe. I realized the identity of that mood of nature in which these waters were poured down with such absorbing force, with that in which the Indian was shaped on the same soil." Fuller stands, alone and unaided, at the brink of America's formation: "For continually upon my mind came, unsought and unwelcome, images, such as never haunted it before, of naked savages stealing behind me with uplifted tomahawks" (*Summer*, 4). Elizabeth McKinsey observes that Fuller uses "historical references to describe the intensity of her feeling at the Falls." At this moment, for example, she reproduces a historical narrative in terms of popular images of the time, specifically John Vanderlyn's *The Death of Jane McCrea* (1804), a harrowing painting of the scalping of a young woman by two Algonquin Indians.[60]

Fuller attempts to see Niagara "in its original context," as McKinsey puts it, but cannot sustain the image of this terrible and grand past in the face of modern development at the falls. By the end of the Niagara passage, Fuller discerns that just as the cataract will be tamed by the crush of the "mushroom growth" of the American nation, so too will images of the savage Indian retreat, as Susan Fenimore Cooper wrote, into mere "recollections of his vanished race."[61] This image of the Indian foe of colonial times and texts not surprisingly both appears and disappears at the precise moment when Fuller demands that the scene furnish "after a while, to the faithful observer its own standard by which to appreciate it" (*Summer*, 4). The fierce Indian, tomahawk raised in attack, was "shaped on the same soil" on which Niagara's waters "poured down with such absorbing force" (*Summer*, 4). Both vanish as Fuller records her present-day experiences with the built-over falls and the displaced, impoverished, and above all real American Indians on the western frontier.

Niagara's eighteenth- and early-nineteenth-century status as a symbol of America's potential cannot be overstated. Given the position of the falls at the forefront of America's early technological experiments, Fuller carefully chose to locate her discussion of utility and beauty in the American landscape at Niagara Falls. William Irwin records in his study of the commercial development of the Niagara area that the falls were instantly recognized as a key location for the growing nation's military, industrial, and aesthetic

development. In typical American fashion, "Niagara's owners saw no contradiction between development and romantic appreciation of the natural spectacle." As a result, the building of luxury tourist accommodations and viewing stations that provided superb vantage points for observing the falls proceeded apace with the construction of the mills and factories that took advantage of the power generated by the water.[62]

Some observers, however, saw the ruthless destruction of the area around the falls (and indeed, of the cataract and rapids) in the name of progress and development as a warning of the disease of capitalist utilitarianism threatening the heart of the nation. "For every nature lover who hailed the Niagara region as an eternal spectacle or an Edenic paradise," Irwin writes, "another utilitarian visionary coveted its milling and manufacturing potential."[63] Unlike the truly sublime yet terrifyingly beautiful scene that engulfed the viewer, the onlooker of the Niagara spectacle had the power to overwhelm this landscape by considering its manifold uses. Thus, as Fuller cautiously celebrates the pulsing, tumbling scene before her, she warns of the specific threat to the potential of both Niagara and the greater American landscape: the "love of *utility*" (*Summer*, 5). The environmental devastation around the falls demands a moral response, albeit a very different response from that posited by Almira Phelps. Fuller's desired moral response combines material considerations with aesthetic appreciation—use tempered by a concern for beauty. The evils of "utility" hang over the scene that Fuller reproduces in her interactions with the waterfall, and her meditations on the vista before her are interrupted by a sneaking fear that the development of Niagara will progressively deform the landscape. Right action in this context involves rethinking the development ethic of the nation.

One striking instance of this disruptive potential of the American "love of utility" occurs as Fuller sits at Table Rock, where "all power of observing details, all separate consciousness, was quite lost." The vista, however, apparently is not so awesome that it prevents Fuller from spying a man who "came to take his first look" at the cataract. "He walked up close to the fall," she writes, "and, after looking at it a moment, with an air as if thinking how he could best appropriate it to his own use, he spat into it" (*Summer*, 5). Although Fuller tries to dismiss this vulgar act and recover her sublime moment, each attempt is undercut by the intrusion of the built into the natural. The vulgar utilitarian who spits into the falls has no appreciation of the landscape as possessing an aesthetic value that exists in conjunction

with its income-generating potential. This figure stands in opposition to the "true" utilitarian, who understands the importance of beauty, history, and harmony and whom Fuller expects to meet in the still wild frontier. And although she heroically claims that the Niagara "spectacle is capable to swallow up all such objects," Fuller knows that all swallowed objects will rise to the surface at a later point (*Summer*, 5). These objects, which embody the ethos of progress that compels development in America, will ultimately, Fuller worries, "obliterate the natural expression of the country" (*Summer*, 29). Indeed, by the 1840s, Niagara's built environment—the tourist facilities and attractions, the guides and the recluse that Fuller lampooned—had virtually overwhelmed the area.[64] Modern visitors to Niagara Falls discover that Fuller's fears were well founded: Table Rock is no longer a space inspiring sublime rapture but rather the location of a tourist information facility ready to satisfy a wide variety of material desires.

Fuller establishes her definition of utility in the American context in this opening Niagara chapter, and she argues that America will be rescued by an ethos of use mediated by a concern for beauty. A theory of utility that subjugates the intrinsic beauty and majesty of the landscape, that imprisons and insults the "natural grandeur of the scene," will not, she hopes, "be seen on the historic page to be truly the age or truly the America" (*Summer*, 5). But the ideal harmony of opposites that drives Fuller's observational strategy, as Stephen Adams notes, cannot last, ending "in disappointment, anticlimax, and wasted potential."[65] Fuller's worry over this wasted potential is manifest as she lampoons the tawdry Americanisms of the spectacle. One potent symbol of this wasted potential is an eagle that the author sees "chained for a plaything" by the side of the falls (*Summer*, 6). Fuller's use of the eagle as a symbol for the degradation of the Niagara landscape would certainly have resonated with her audience, as the bird possessed a long association with the seemingly untamable environment around the cataract. Eagles also appeared in countless representations (writings, paintings, and so forth) of the falls, and most readers of *Summer on the Lakes* would undoubtedly have been familiar with the image of the eagle, from Alexander Wilson's best-selling *American Ornithology*, crouched in front of the raging cataract and tearing into a large, bloody trout.

Fuller introduces readers to this now degraded bird by first recalling a childhood memory of an eagle chained outside a museum: "The people used to poke at it with sticks," she writes, "and my childish heart would swell with indignation as I saw their insults" (*Summer*, 6). Fuller notes

that she "never saw another of the family till, when passing through the Notch of the White Mountains, at that moment striding before us in all the panoply of sunset . . . we saw, soaring slow in majestic poise above the highest summit, the bird of Jove" (*Summer*, 6). Fuller's complex presentation of her sightings of the bird reveals her interpretative intent. She first sees the imprisoned bird outside a museum, where people passively receive information distilled and ordered for simple consumption. These museum-goers, she implies, have not developed the skills needed to see or understand the "monarch-bird" in its true majesty. Her next sighting of the bird, at the Notch of the White Mountains, has similarly profound connotations, as the Notch had long been the recorded site of sublime transformations, a place where the solitary individual faced the terror of the majestic.

In this passage, Fuller uses the eagle to juxtapose Niagara against both the museum and the wild and in so doing forces readers to consider which model will prevail. Not surprisingly, she concludes her meditation on the bird with an ambivalent response: "Now, again, I saw him a captive, and addressed by the vulgar with the language they seem to find most appropriate to such occasions—that of thrusts and blows. Silently, his head averted, he ignored their existence. . . . Probably, he listened to the voice of the cataract, and felt that congenial powers flowed free, and was consoled, though his own wing was broken" (*Summer*, 6–7). The eagle embodies Fuller's confident hopes and lingering fears for the possibility of harmony between nature and nation. It represents her hope that the individual can escape the "general theoretical view of the masses" about which Goethe warned and can experience the sublime union of opposites. It is somehow fitting, then, that Fuller follows this depiction of the eagle of Niagara with a portrait of the brutal existence of settlers on the frontier. She thus undercuts the expectation, hinted at here, that the spectacle of wild nature at Niagara (and Niagara as a metaphor for the nation) will be saved from the pressures of its manufactured environment. She seems to ask, if Niagara—remote, brutal, inaccessible—can be forced to bend to human will and manipulation, what chance does the "blooming plain," with its groves of trees "large enough to form . . . pillars for grand cathedral aisles," stand in the path of the "swarms of settlers, whose aims are sordid, whose habits thoughtless and slovenly" (*Summer*, 25, 32)?

Fuller's 1843 travels gave her the opportunity to test through empirical study her hypothesis about the limits of the nation's growth, and to a great extent, she was not disappointed by the type of settler she met in the West.

Indeed, her letters to friends back home in Massachusetts echoed the biting portrait of the average, vulgar settler with his "go ahead" motto that she produced for her public readership. Her private correspondence also shows that the author had long been thinking about the type of development necessary to produce both the ideal America and the ideal American. She described this development in a long 1840 letter to Channing:

> The effect of continued prosperity is the same on nations as on individuals,—it leaves the nobler faculties undeveloped. The need of bringing out the physical resources of a vast extent of country the commercial and political fever incident to our institutions, tend to fix the eyes of men on what is local and temporary, on the external advantages of their condition. The superficial diffusion of knowledge, unless attended by a correspondent deepening of its sources, is likely to vulgarize rather than to raise the thought of a nation. . . . They see a wide surface, and forget the difference between seeing and knowing. In this hasty way of thinking and living, they traverse so much ground that they forget that not the sleeping rail-road passenger, but the botanist, the geologist, the poet, really see the country.[66]

Fuller valued people with the ability to render the whole from the particulars—that is, scientists and artists. Yet Fuller despaired privately as well as publicly of the wasted potential of the new scene, of the "great influences" that seemed to "tend so exclusively to bring riches out of the earth; should that task" of developing the "nobler faculties," she plaintively asked, "ever have a long period *exclusively to itself*?" She complained that the rush to wring profits from the soil and the "merely instinctive existence," as she wrote to Emerson, of "those who live it so 'first rate' 'off hand' and 'go ahead' " destroyed any possibility of a harmonious development both of the landscape and of the communities and families that would inhabit that landscape.[67] The settlers' approach to the vista and land before them resembled the mechanistic approach that Newton took to optical theory or that Phelps's students took to botany. In their "superficial" understanding of the scene before them, these settlers saw the land only in terms of preestablished definitions—that is, its commercial and mercantile possibilities. In the "mushroom growth" of the American West, "the village cannot grow into the gentle proportions that successive lives, and the gradations of experience involuntarily give" (*Summer*, 18). Fuller's definition of good

utility privileges harmony over separation; the traveler traversing the ideal geography of the new space moves not from "town to town" (a view that stresses mercantile opportunities) but from "grove to grove" (an approach that values harmonious development) (*Summer*, 25).

Fuller meditates on the harmonious possibilities of the American landscape throughout her travels. To her, these groves "seemed fair parks, and the little log houses on the edge, with their curling smokes, harmonized beautifully with them" (*Summer*, 25). Fuller repeatedly describes her ideal community as constructing its individual domestic scenes in concert with nature's vistas and rhythms. The successful settler family locates its model western villa on "grounds which could not be improved," while "within, female taste had veiled every rudeness" and the "fragments of city life were dexterously crumbled into the dish prepared for general entertainment" (*Summer*, 36, 37). Fuller argues that such a well-constructed house, seamlessly combining use and beauty, will inevitably produce a community where a settler can "afford to leave some of [the land] wild, and to carry out his own plans without obliterating those of nature" (*Summer*, 38). In this unfenced landscape—what John Stilgoe calls the borderlands ideal—settler and settlement, culture and nature, can grow together in the garden of the American frontier.[68]

Throughout *Summer on the Lakes*, Fuller reiterates the qualities she values in the burgeoning communities, especially the idea of harmony within and without the home. The other most important qualities include an education that fits the landscape of habitation. She meditates on such development as she travels though Wisconsin, which she terms an "acorn" because of its territorial status. This notion of the acorn waiting to grow into a tree and the territory waiting to be brought fully into the American nation resounds in Fuller's vocabulary. Free Hope, for example, waits for "an amaranth or a palm" growing in every clod of fact; similarly, Fuller writes to Channing, "It was not meant that the soul should cultivate the earth, but that the earth should educate and maintain the soul."[69] Like Phelps, Fuller draws on Emma Willard's language in *A Plan for Female Education*: "Would we rear the human plant to its perfection, we must first fertilize the soil which produces it. If it acquire its first bent and texture upon a barren plain, it will avail comparatively little, should it be afterwards transplanted to a garden."[70]

Girls who received their educations in the East would soon find them-

selves transplanted to the West, and Fuller wants to assure them that western America possesses the rich soil needed to "maintain the soul." It is the perfect location for the "fine" town that seems "to grow before you, and has indeed but just emerged from the thickets of oak and wild roses" (*Summer*, 69). Fuller details an example of the organic development that will divert the nation from its damaging materialistic course. Like the amaranth or palm, the home that must "grow up at last from the rich sod" will possess a transcendent, imaginative quality that will long outlive its present usefulness. Her description of this homestead mirrors perfectly the type of picturesque calm prevalent in contemporary landscape painting and writing: "As we approached, [the home] seemed the very Eden which earth might still afford to a pair willing to give up the hackneyed pleasures of the world, for a better and more intimate communion with one another and with beauty: the wild road led through wide beautiful woods, to the wilder and more beautiful shores of the finest lake we saw" (*Summer*, 75, 76). Even the vicious Indian foe of Niagara has been transformed into a pacific idler, aimlessly "paddling to and fro" on a lake "glittering in the morning sun." The settler's home gradually appears in the scene, standing not apart from but amid the natural objects around it, "beneath trees which stooped as if they yet felt brotherhood with its roof tree." In this Edenic landscape, "flowers waved, birds fluttered round, and all had the sweetness of a happy seclusion; all invited on entrance to cry, All hail ye happy ones! to those who inhabited it" (*Summer*, 76).

If Phelps hoped to create a space in which the daughter of Eve could study and learn, then Fuller creates in the frontier a place in which that daughter can live. Fuller anticipates finally meeting the new Eve, a woman with the elegance of the natural world, "new, original, enchanting" (*Summer*, 39). The woman's husband represents Fuller's ideal villager, "a man whose eye reads the heavens while his feet step firmly on the ground, and his hands are strong and dexterous for the use of human implements" (*Summer*, 64). This settler marries experience and intuition, intellect and imagination, and constitutes Fuller's good, "true" utilitarian. He knows "how to make use of the past, as well as to aspire for the future, and to be true in the present moment."[71] He understands the problem of beauty and use in the American context and has the capacity to construct a new, vital response that will maintain the necessary harmony of the landscape.

Yet, because *Summer on the Lakes* is driven by the dynamic of object and its opposite—or, as Goethe wrote, by the eye, "pathologically affected [in

its] demand for completeness" (*Colors*, 10)—the text chronicles the way in which disappointment at reality follows always at the heels of the joy the imagination inspires. Fuller's idyllic vision of the successful domestic space is undermined by her potent discussion of the frontierspeople's imprisonment in the rude, comfortless cabins they inhabit and in the constant, grinding round of work they must perform. The "newfound frontier fantasies" of "an eagerly westering nation" often lead to "domestic captivity—even in Eden" for the settler wives, mothers, and daughters brought along on the journey.[72] Indeed, just as Fuller refuses to embrace the limiting rhetoric of the sublime at Niagara Falls, so in these descriptions she refuses to kowtow to the conventions of the picturesque aesthetic. This painterly aesthetic, adopted by nineteenth-century Americans as a way to comprehend their vast and largely uncharted landscape, relies on relations of parts to a whole, on an attention to how minute details function in creating a panoramic vista. Human figures appear, often at a distance, in picturesque depictions of the landscape, but their actions, especially their labor, are often obscured in the effort to produce a narrative of harmony between the human and nature. Fuller, however, intentionally reproduces exactly those conditions of labor and struggle that are buried in conventional picturesque representations. Steele sums up Fuller's problem with the picturesque aesthetic, noting that the "picturesque gaze detaches the viewer from persons or places, which are judged solely in terms of their appropriation within a specular pleasure."[73] Fuller's charming portrait thus ends on a melancholy note: "But on entrance to those evidently rich in personal beauty, talents, love, and courage, the aspect of things was rather sad" (*Summer*, 76). Fuller describes the unfortunate series of circumstances—"sickness . . . death, care, and labor"—that have befallen the young settler couple and remarks that "refined graces, cultivated powers, shine in vain before field laborers" (*Summer*, 76).

As she tells the poignant tale of the inhabitants of the cabin, "these . . . nurslings of the court and city," Fuller warns readers that "damask roses will not thrive in the woods, and a ruder growth, if healthy and pure, we wish rather to see there" (*Summer*, 77). Fuller's description of the objects found in the parlor of this home, especially the "album full of drawings and verses which bespoke the circle of elegant and affectionate intercourse they had left behind," is especially touching in light of the lessons Almira Phelps sought to give her students. Objects in her students' parlors were to reflect the progress of their educations; in particular, her botany students should

display their herbaria as the record of long hours spent traipsing through the local landscape learning about nature and humans' place in it. The albums Fuller sees neither represent such physical grounding in the landscape nor display the present, lived experience. In a way, though, these albums answer the previously posed question of the diligence of Phelps's botany students. Fuller's clear indictment of the frontierswoman's lack of knowledge of the natural world—of the real "language of flowers"—couples with her inability to adapt to the new conditions assaulting her senses to reveal that in the end Phelps's daughters of Eve are more committed to the conventional, unexamined meanings of natural objects.

This concern for proper education, for an education that fits a woman to the duties of the home, links Fuller directly to Phelps despite their differences. Phelps wanted her botany lectures to result in a sentimentally scientific lady who understands the world around her and has cultivated both her intellect and her tastes. Fuller would have approved of the moral grounding that such a figure possesses but clearly worried about the sentimental aspect of this scientific lady. Western migration removed many women from the settled space of the East, replacing comfort and cultivation with toil and sordidness. In the frontier's ramshackle houses and desperate families, Fuller witnesses the failure of Phelps's educational strategies. Those eastern-trained students do not fare well in the barely cultivated wilds of the American frontier. As Annette Kolodny notes, Fuller claims that the wives and daughters who inhabit the frontier cannot enjoy and participate in their new landscape because they lack the education that would enable them to interact productively with the surrounding environment.[74] Unlike a productive and successful woman such as Jane Colden, who used her botanical lessons to both inform and beautify her home space, the women on the western frontier have been abandoned in what is, to them, an intellectual and aesthetic wasteland. Utility—the real, bare needs of life on the frontier—takes precedence over any concern for beauty. Although the frontier home is surrounded by a natural garden that can easily be transplanted inside, the frontier wife has not learned the proper skills to make that transition possible. Fuller confronts this problem in her text as she meditates on how effectively to transport the educational principles established in the safe, static landscapes of the East to the shifting space of the West.

Fuller wants to see a different figure inhabiting the West, a "ruder growth" who can take what she learned at school and translate it to the new

landscape. This translation is itself an act of reproduction, taking what has been learned and using that knowledge in a variety of different circumstances. This woman is decidedly not a damask rose; instead, she radiates the out-of-doors. According to Fuller, "To a girl really skilled to make home beautiful and comfortable, with bodily strength to enjoy plenty of exercise, the woods, the streams, a few studies, music, and the sincere and familiar intercourse, far more easily met here than elsewhere, would afford happiness enough" (*Summer*, 40). This girl would be perfectly suited for the advantages of her environment, with "the strength of body, dexterity, simple tastes, and resources that would fit [her] to enjoy and refine the western farmer's life" (*Summer*, 39). Unlike the woman who refuses to divest herself of urban desires, this new woman's "eyes would not grow dim, nor her cheeks sunken, in the absence of parties, morning visits, and milliner's shops" (*Summer*, 40). Most importantly, she would contribute productively to the growing national space by serving as a model for new arrivals.

*Summer on the Lakes* neither leaves readers trapped without the means to reconcile the problem of perception, utility, beauty, and education in the American landscape nor leaves frontier women without mentors in their new homes. The rude and vulgar settlers are continually shadowed by the specter of the American Indian nations they have displaced. Fuller exhibits a deep concern for the displaced, degraded peoples that she meets as she travels deeper into the Great Plains. In fact, the last lengthy chapters of her text are dedicated almost entirely to representing the dismal conditions of these formerly independent and functional communities. Fuller sees the colonization of the North American continent in terms of universal and specific history. As Ann Douglas notes, Fuller's interpretative approach, her "vision," is essentially historical as opposed to literary or metaphorical.[75] Fuller assures readers that she has "not wished to write sentimentally about the Indians, however moved she might have been by the thought of their wrongs and speedy extinction" (*Summer*, 143). She brackets her accounts of the tribes she sees with extracts from the writings of a variety of ethnologists, anthropologists, phrenologists, and missionaries as a way of uncovering, re-creating, and recording Indian cultures that are rapidly being destroyed by white settlement. Fuller provides this information to show her readers that she believes that these indigenous communities adhere to the formula of beauty and utility that she recommends for her settler families.

Fuller's perception of the tribes she meets on the frontier is certainly problematic. Despite the obvious value she places on the individuals she meets, at no point in her narrative does Fuller state a belief that the displaced tribes would (or even should) regain their prominence in the American scene. She, like most of her contemporaries, sees these groups as decimated cultures, and she employs the common trope of the vanishing Indian primarily to demonstrate that Americans have reached a turning point: they can develop in themselves the proper skills of perception or they can "go-ahead" after quick profit. Yet this point of view in no way diminishes Fuller's conception of the present worth of indigenous peoples or their importance to the American community at large. Fuller sadly realizes that the real and brutal process of frontier development is incompatible with the ideal, harmonious cohabitation she envisions. Because Fuller fears the unavoidable reality that the dispossession of native peoples will occur, she offers the pale solution of preserving a record of these cultures: "We hope, too, there will be a national institute, containing all the remains of the Indians,—all that has been preserved by official intercourse at Washington, Catlin's collection, and a picture gallery as complete as can be made, with a collection of skulls from all parts of the country. To this should be joined the scanty library that exists on the subject" (*Summer*, 143).

*Summer on the Lakes* in part contributes to the necessary task of adding to the store of information about native cultures, and the text works as an important record of the tribes Fuller encountered in Illinois, Wisconsin, Mackinaw, and Sault Ste. Marie. Fuller and her traveling companions see "Indians for the first time" while steaming up the St. Clair River (*Summer*, 12). As the name of the river implies, Fuller sees clearly the dark future of these tribes, noting that they possess a "lounge and a stride so different in its wildness from the rudeness of the settler." This "wildness" is a positive quality, akin to the wildness that Thoreau would later claim as the "preservation of the world."[76] Almost immediately, however, the noisy "clash of material interests" represented by her fellow passengers, the immigrant "New Englanders" "seeking their fortunes" in the West, disrupts Fuller's meditations (*Summer*, 12). This brief moment captures in miniature the tensions between indigenous peoples and settlers on the frontier that *Summer on the Lakes* records. As the narrative continues, Fuller's interest becomes increasingly drawn toward the tribes she encounters on the frontier. At first she sees them invariably from both far away and above, often looking down

on tribal groups from "some near height" (*Summer*, 107). She initially sees them as picturesque elements of a picturesque landscape: at Mackinaw, for example, she watches from her boardinghouse window as representatives of the Chippewa and Ottawa tribes gather to receive disbursement of their "annual payments from the American government" (*Summer*, 105). Women set up tent poles and cook while children play as men return from hunting expeditions with fresh-killed game. Her descriptions conform to standard picturesque representations. The window frames the activity below as if it is a picture, while the work performed by the distant figures takes on the "charm" of "romantic sketches" (*Summer*, 108). However, Fuller cannot maintain this aesthetic distance from her subjects. Because understanding comes through experience, she seeks instead the same vital contact with these people that she had sought with the settlers. She leaves the safe vantage of her boardinghouse to "walk or sit with them," an endeavor that meets with approbation from her lady companions, who are repelled by the camp's dirt and smell (*Summer*, 108).

While Fuller's descriptions of American Indians often demean her subjects and serve only, as Nicole Tonkovich notes, to "reinscrib[e] the Indians in terms and hierarchies already established" by historians and ethnographers, Fuller actively resists treating the American Indians she sees merely as picturesque elements of the traveler's landscape.[77] Just as Fuller's depictions of settler homes display conditions often obscured in conventional picturesque representation (such as labor and poverty), so her representations of Indian communities defy picturesque conventions. Although the "departing canoe" of the Indian family that has received its payment on the banks of the St. Clair appears to her a "beautiful object," the land itself records the "blemishes of their stay": "They left behind, on all the shore . . . old rags, dried boughs, fragments of food, the marks of their fires. Nature likes to cover up and gloss over spots and scars, but it would take her some time to restore that beach to the state it was in before they came" (*Summer*, 152).

For the Indians Fuller meets in this camp, increasing contact with whites is causing their culture to disintegrate; after all, these tribes have gathered on the shore to receive payment for lands taken from them. Historically, Fuller notes, Indian communities refused to "deform" the lands on which they lived. In recording her experiences with individuals of these tribes, Fuller offers a model of settlement and utility that differs markedly from

those encountered in the settler homes and communities. It derives from lessons taught by people whose long habitation in a region has "adapted" them to the "uses and enjoyments" of that particular place (*Summer*, 135). In the later chapters of *Summer on the Lakes*, Fuller creates a portrait of cultures that privilege detailed and use-driven knowledge of the landscape while respecting the intrinsic beauty of the places they inhabit.

Fuller cannot help but see the lineaments of American Indian settlements in the places she visits. Indeed, the disparity between the harmony achieved by the early inhabitants of a place and the "slovenliness" of the newer settler homes makes the ghosts of those former residents painfully apparent. In the Rock River area of Illinois, Fuller writes, "Seeing the traces of the Indians, who chose the most beautiful sites for their dwellings, and whose habits do not break in on that aspect of nature under which they were born, we feel as if they were the rightful lords of a beauty they forbore to deform." *Summer on the Lakes* is all about attentive observation, and Fuller cannot avoid being disappointed in the very real settlers who do "not see [that beauty] at all; . . . it speaks in vain to those who are rushing into its sphere." "Their progress," she determines, "is Gothic, not Roman." Driven as they are by an ethic of destruction and plunder as opposed to one of synthesis and adaptation, "their mode of cultivation will, in the course of twenty, perhaps ten, years, obliterate the natural expression of the country" (*Summer*, 29). The gap between cultures seems unbridgeable in Fuller's text: settlers will, in the course of time, remove American Indians completely from the scene as surely as they will "obliterate the natural expression of the country." Like the eagle chained at Niagara Falls, the people will understand the original inhabitants of the country only as static constructs whose cultures are relegated to the shelves of the museum. But again, as the reality of a situation lies in the perception of it, this outcome is not, at this moment, fixed. If the settlers begin to view both the people and landscape with fresh, new eyes, then limitless possibilities, limitless narratives, open up.

Flowers notably form a possible bridge between these two cultures, between these two seemingly antithetical views of the natural world. Fuller's most intimate experiences with the tribes she sees occur during walks, as she inspects the flowers of the "blooming plain." Fuller indicts the sentimental aspects of flower study when she indicates the lack of useful knowledge she and her friends possess. While they see the beauty in a plant, they can "only

look on to admire [a flower's] hues and shapes." They can give the plant a mythic history, as the "mysterious purple" plains flower that "springs from the blood of the Indians, as the hyacinth did from that of Apollo's darling," but they cannot ascribe to that plant any useful qualities. In direct contrast, the Indian women, "those students of the soil" who accompany Fuller on her flower walks, appreciate both the beautiful aspects of flowers and the purposes each "fair emblem" can serve. Each plant, each flower, each spot on the landscape, has a use, a history, and Fuller often reminds readers that for every "golden and flame-like flower" spotted by a white traveler, there is a "Wickapee" whose "splendors had a useful side, for it was used by the Indians as a remedy for an illness to which they were subject" (*Summer*, 21). Fuller and her traveling companions profit from their guides' knowledge: "Of some of the brightest flowers," she wrote, "an Indian girl afterwards told me the medicinal virtues" (*Summer*, 41).

In Fuller's view, men and especially women on the frontier need to "tread the wildwood paths" and take a full measure of the education that nature yielded (*Summer*, 39). She even exhibits a nascent understanding of bioregionalism in botany when she notes that the rattlesnake weed, a nonnative plant, "grows in profusion" in the "white-man's footstep" (*Summer*, 41). Indeed, just as botanical study is essential to Phelps's conception of proper education, flowers are essential to Fuller's understanding of the harmonious possibilities of the landscape, an understanding that she argues the American Indians possess from long habitataion on the land. But comprehending flowers does not mean knowing just botany or sentimental flower language, as the beauties and uses of flowers transcend both the rigidity of the science and the carelessness of the sentiment. In her approach to flower study, Fuller again follows Goethe's lead—specifically, in the presentation of plant science found in his botanical treatise, the *Metamorphosis of Plants* (1789). As Lisbet Koerner writes, Goethe believed that "plants' relations could be grasped though an understanding of the natural world that was at once teleological and historicist." This understanding, she continues, "depended as much on a scientist's personal sympathy with nature as on his systematic study of it."[78] Goethe's plant studies melded law and love, fact and imagination, into a well-fitted whole. He argued that the plant, in its structure and growth, contained within it the history of all plants. Fuller sees plants in the same way. As she writes in "The Magnolia of Lake Pontchartrain," "I became acquainted with the flower, and found all its life in harmony."[79]

Fuller's vision of flowers is symbolic, but she does not want to rely on the kinds of fixed relations between a flower and its meaning found in popular sentimental flower books. Nevertheless, she agrees with the idea that flowers function as emblems, representing maternal love and serving as the "mothers" who, like Eve, actively inhabit an idyllic domestic garden. But Fuller also sees flowers and gardens as serving a specific purpose: the garden works in conjunction with the library to produce a balanced individual. The garden provides a refuge for the intellect. It teaches "in another temper" than the spare "socially utilitarian" space of the library—the eagle living simultaneously in the White Mountains and at the museum.[80]

If settler women can learn to see nature according to the terms of the frontier, if they can bring nature into their homes and learn how plants and flowers can beautify and improve the conditions of frontier life, then the frontier can become a place worthy of the American nation. Fuller highlights the flower's ability to unite and produce harmony over separation in a short story, "Yuca Filamentosa," in which an unnamed woman takes a nighttime walk and inspects the blooms of her beloved *Yuca filamentosa*. Despite the woman's dedicated care and knowledgeable tending, these plants have failed, year after year, to blossom. On this night, however, the woman observes "with pleasure" that both plants have at long last "disclosed [their] delicate cups." The woman gazes long at the flowers, her "heart swell[s] with emotions," and she is compelled to share this moment with her husband. Like the average frontier settler, however, this man possesses a mind and heart that have "never been made interpreters between nature and the soul." But just as the flower expresses limitless possibilities and manifold uses, so it has the power to convert the unbeliever, and Fuller joyfully exclaims, "The piercing sweetness of this flower's look in its nuptial hour conquered even his obtuseness." Fuller ends this tale by elevating the *Yuca*, a member of the medicinally and historically useful aloe family, over the merely beautiful lily and rose: "Admirable are the compensations of nature. As that flower, in its own season, imparted a dearer joy than all my lilies and roses."[81] Eve and Adam together look on the flower and admire the pressure of its hidden causes.

As this story indicates, Margaret Fuller sees necessary roles for all inhabitants of the garden of the West: Indian and settler, human and nonhuman, man and woman, scientist and poet. Seeing the landscape properly entails reading that landscape as a moral space that demands viewer participation

in the spectacle observed. Goethe's scientific studies taught Fuller to discern the connections between objects in the natural world, to have, to use Koerner's terms, "sympathy with nature." Such sympathy extended to the humans who occupied that natural world and translated into an understanding of how humans should act on that land. Fuller hoped for the harmonious development of the West. But like the spectacle of Niagara, the conquest and cultivation of the rapidly shrinking frontier constituted an unknown drama, and the consequences of that conquest on the land and its inhabitants remained to be seen. Fuller called on people not to repeat the mistakes of the past, which could clearly be seen in the dimmed beauty of Niagara Falls. She believed that the natural landscape should serve the interests of both individual and nation, but she warned against the destruction of resources—both actual and aesthetic—in the quest for material prosperity. America's vast forests, for example, both fed the sawmill and the steamship and served as the leafy roof of the cathedral. Like her near contemporary Susan Fenimore Cooper, Fuller decried the damage done to her environment because it not only spoiled the view, so to speak, but also obscured the social and moral lessons encoded in natural processes. In *Summer on the Lakes*, she not only celebrated the landscape she traversed but also demanded that elements of those spaces be preserved. The landscape records (human) history: artificial monuments testify to human ingenuity, while natural monuments, like a stand of trees or Niagara Falls, testify to human potential. Despite its pessimism, *Summer on the Lakes* offers moments of real hope. In Fuller's eyes, the real, extraordinary, and unique potential of the American landscape is its readiness to sacrifice itself to feed the imagination of the immigrants it welcomes. "Thus," she writes as she contemplates her trip, "I will not grieve that all the noble trees are already gone . . . to feed this caldron, but believe it will . . . reproduce them in the form of new intellectual growths, since centuries cannot again adorn the land with such" (*Summer*, 18).

CHAPTER THREE

# The Noble Designs of Nature

## *Susan Fenimore Cooper, Natural Science, and the Picturesque Aesthetic*

IN 1850, Susan Fenimore Cooper (1813–94), the daughter held most dear by James Fenimore Cooper, published *Rural Hours*, arguably the first seasonal nature journal written by an American woman. In the years prior to the book's publication, Cooper walked through the woods and fields around her Cooperstown, New York, home. She experienced her world firsthand and recorded all she saw there for the benefit of her reading public. She walked almost daily year round, in foul weather and in fair. On the rare occasions when she could not walk, Cooper availed herself of her father's extensive library and read about what she might see if she were outside. Virtually every object fell under the author's intensive scrutiny, and she brought even the smallest details to the attention of her readers. Unlike Margaret Fuller, whom critics chided for her failure to anchor her intellectual meditations in the particulars of nature, Cooper received praise for her close attention to the rich details of the natural world, and *Rural Hours* offers a comprehensive map of the plant and animal communities of Cooperstown. The book met with "substantial" success when it was published in 1850, according to Rochelle Johnson and Daniel Patterson, and appeared in seven American editions and one British edition within five years of its initial publication.[1]

Cooper shared many close affinities with both her literary predecessors and her contemporaries. She followed Almira Phelps into the woods and fields and found in the natural world a model for moral behavior—specifically, a model that women could transport inside to make the home a better place. Cooper's firm conviction that the power women wielded

was "moral and religious rather than political" aligned her with other popular writers such as Catherine Maria Sedgwick and Harriet Beecher Stowe, who, as David Reynolds explains, saw women as the "moral savior[s] of a threatened social system."[2] Although Cooper's refusal to participate in feminist politics set her far apart from Margaret Fuller, the struggle to find a language and a mode of representation that would make her world and the dramatic changes that she witnessed there understandable unites her project with Fuller's. In *Rural Hours*, Cooper interrogated the languages of science, religion, sentimentalism, and aesthetics and challenged her readers to rethink their ways of seeing the natural world.

In the preface to *Rural Hours*, Cooper gives her readers an easy way to fix the identities of both author and text through the metaphor of gleaning. "The Lady" of the preface is a mere collector who "naturally gleans many trifling observations of rustic matters" while "wandering about the fields" and who then recollects these scraps for the pleasure of her friends.[3] Gleaning or gathering together the scraps left by regular gatherers is by nature a humble activity performed by humble figures, and Cooper here allies herself with the other gleaners that people her text, the "mothers, children, and the aged"; Ruth, the gleaner of the Old Testament; newly arrived immigrant women; and birds, squirrels, and other small animals (*Rural Hours*, 159). These unassuming figures perform their secondary activity only after the real work of reaping has been completed. As a "feminine form of agricultural labor," according to Lisa Stefaniak, gleaning is by definition a gendered practice, performed by those who find themselves at the margins of society.[4]

If the reader believes the rhetoric of the preface, Cooper is not an author but simply a domestic woman who shares her "trifling observations on rustic matters" with her friends by the fireside. She also vehemently protests that she is not a scientist. Although the "trifling incidents" she records in her journal include descriptions of migratory bird patterns and of the gradual decimation of both species and habitat, she makes "no claim whatever to scientific knowledge" (*Rural Hours*, 3). As a writer of a "rustic primer" on the subject of America's native birds, trees, plants, butterflies, and insects, Cooper metaphorically gleans the fields of other, more proficient reapers of knowledge—theologians and philosophers, botanists and ornithologists, landscape artists and theorists. Yet these gleanings also show her grappling with the interpretive shifts in the meaning of nature that the-

ology, philosophy, botany, and ornithology were bringing to nineteenth-century America.

If the preface pledges that *Rural Hours* will be a simple journal comprised of modest observations, then the text far exceeds that humble promise. *Rural Hours* constitutes much more than "the simple record of those little events which make up the course of the seasons" (*Rural Hours*, 3), offering instead an intricate, expansive investigation into the shifting portrait of the landscape surrounding the author's home. In fact, Cooper is anything but a "mere recorder" (to use Mary Austin's words) of the events around her.[5] Cooper not only strives to apprehend the natural events of Cooperstown but also struggles to interpret those events as part of a larger narrative of home, nation, history, and divinity. Read in this way, the terms of the preface are misleading. Cooper describes events as "trifling" and her locale as "rustic." In fact, the changing of the seasons, the passage of time, and the effects of human habitation on the landscape—in other words, the natural and national histories chronicled in *Rural Hours*—are not trifling occurrences. And just as Cooper transforms the meaning of *trifling*, she performs a similar alchemy with the term *rustic*. Readers of *Rural Hours* quickly discover that Cooper is both familiar with and critical of scientific terminology. Rather than privileging the scientist's "strange tongue sputter[ing] its uncouth, compound syllables upon the simple weeds by the way-side," Cooper prefers the rustic's knowledge, with its functional, descriptive, and utilitarian terms (*Rural Hours*, 83).

In *Rural Hours*, Cooper attempted to make a comprehensible whole out of her gleanings and to reconcile the competing discourses that governed her representations of nature. For Cooper, God remained firmly entrenched in the details of the natural world; these details, in turn, revealed the particulars of a divine plan. Yet Cooper, despite her stance as a faithful Christian and traditional woman who extolled the virtues of the domestic realm, was often not content to confine her descriptions within the restrictive rhetoric and metaphors of a domesticated natural theology. As a chronicler of the American nation, Cooper followed closely in her father's footsteps and presented to her readers a comfortable portrait of a domesticated land, a tamed place freed from its wild past. As an innovative writer and editor experimenting with literary forms, however, she also participated in the rich literary activity of the American Renaissance, sharing with writers such as Fuller, Ralph Waldo Emerson, Henry David

Thoreau, Walt Whitman, and Emily Dickinson a desire to craft a truly American literature that took advantage of the sometimes problematic yet uniquely American wildness embodied in the nation's landscape and people. Moreover, Cooper's text, with its critical examination of received traditions, functions as what Reynolds identifies as an "open text," providing "an especially democratic meeting place for numerous idioms and voices from other kinds of contemporary texts."[6] Accordingly, she gives space to a multiplicity of narrative, aesthetic, and scientific voices. Despite her humble protests to the contrary, Cooper proves herself a skilled naturalist well versed in the scientific advances of her day. She observed the minutiae of the plants, animals, and especially birds that inhabited her landscape. She knew her sources, including John James Audubon, Charles Lyell, Alexander Wilson, and Alexander von Humboldt, and honed her observational skills in the field. Following Phelps, Cooper believed that scientific knowledge helped uncover the moral codes of the natural world. Nevertheless, like both the literary and scientific sources to which she turns to explain the objects of the natural world, Cooper guardedly participated in a discourse that overtly criticized received definitions.

*Rural Hours* records Cooper's struggle to find a mode of representation that will allow her to produce an accurate, morally viable record of her observations and experiences of the natural world. Her problems with descriptive language illustrate that she was caught in her historical moment. She values the specificity that scientific observation and language offer but worries that the specialized terms of science threaten to remove both the local and the divine from the picture produced. She privileges rustic knowledge and language but expresses concern that the narrow local perspective cannot accommodate the universal designs of the natural world. Cooper finds relief for her representational dilemmas in the picturesque aesthetic, which governs her apprehension of the landscape. She immediately recognizes the value of this aesthetic for her contemplative exercises. In particular, it allows her to use the tools of science (careful observation and precise description) to ground her conception of the web of moral relationships that govern the natural world. In so doing, she creates a holistic picture of a landscape already subject to the fragmenting tendencies of scientific investigation.[7]

Cooper used the form of the seasonal daily journal to record her observations of the landscape. Some entries in *Rural Hours* are as brief as a sentence;

others are several pages long. Some entries simply record the weather or a flower sighting, while others offer meditations on the goodness of God, the progress of the nation, or the aesthetic appeal of a lake. She relates to her readers accounts of the birds, plants, insects, animals, and very occasionally the people she meets during her walks. If she walks on Sundays, she does not often share that fact with her readers. One typical entry, found in the "Spring" section near the opening of the book, reads,

> *Thursday*, [April] 27th.—Long, pleasant walk. A humming-bird flew past us, the first we had seen.
>
> Followed an old wood road for some distance. Squirrel-cups in abundance; though very regular in other respects, these little flowers are not all colored alike: some are white, others pink, lilac, or grayish blue. They are a nice little flower, with a modest, unobtrusive air, which is very engaging. When they first appear, they shoot up singly, each blossom alone on its downy stalk; but now they have gained courage, standing in little groups, gleaming gayly above the withered foliage. . . . One often sees these flowers at the foot of trees, growing on their roots, as it were; and perhaps it is this position, which, added to their downy, furred leaves and stems, has given them the name of *squirrel-cups—a prettier name, certainly, for a wood flower, than liverwort, or its Latin version, hepatica*. . . .
>
> The arbutus is now open everywhere in the woods and groves. *How pleasant it is to meet the same flowers year after year!* If the blossoms were liable to change—if they were to become capricious and irregular—they might excite more surprise, more curiosity, but we should love them less; they might be just as bright, and gay, and fragrant under other forms, but they would not be the violets, and squirrel-cups, and ground laurels we loved last year. Whatever your roving fancies may say, there is a virtue in constancy which has a reward above all that fickle change can bestow, giving strength and purity to every affection of life, and even throwing additional grace about the flowers which bloom in our native fields. We admire the strange and brilliant plant of the green-house, but we love most the simple flowers we have loved of old, which have bloomed many a spring, through rain and sunshine on our native soil.
>
> Radishes from the hot beds today. (*Rural Hours*, 28–29; emphasis added)

Cooper posits herself as the ideal observer, capable not only of seeing specific objects in nature but also of seeing them in the context of larger social,

moral, and scientific debates and discussions. In this April entry, the details of habit and habitat lead to meditations on proper naming, proper behavior and attitude, and accuracy in perception, three primary concerns to which Cooper returns throughout the text.

*Rural Hours* employs the seasonal journal form, which emphasizes environmental structure and process, to track the rhythms of the environment. As Lawrence Buell notes, the seasonal form mimics "the motions of the environment itself" and relies "on nature's motions to provide the central organizing device."[8] Cooper guides readers across both time and space as the snows of early spring pass into warm summer days, through autumn colors, and into winter's bluster. Detailed knowledge of seasonal changes can come about only after a "long residence" in a specific locale; thus, Cooper speaks as an authority because, as she indicates, she has observed her place over the course of many seasons. Such knowledge is essential to providing an accurate reading of the moral lessons encoded in the environment. For example, on a cool April day, Cooper tells her reader about a "lingering snow-bank" seen "almost every spring . . . long after the country generally looks pleasant and life-like." Cooper's meditations on this particular snowbank over several years lead her to a conclusion about the human condition: "Time gives greater consistency and powers of endurance to snow and ice, just as a cold heart grows more obdurate with every fruitless attempt to soften its fountains; old snow in particular, wears away very slowly—as slowly as old prejudice!" (*Rural Hours*, 22). The cyclical nature of the seasons welcomes the attentive observer with refreshing familiarity *and* acts as a fixed point from which she might observe both positive and negative changes in the surrounding human community. Thus, the progression of the seasons indicates both stasis and change and enables Cooper to read in the landscape a developmental narrative that, like the one found in *Summer on the Lakes*, is both hopeful and cautionary. Snow melts and provides water for growing plants, but it also hardens into ice: landscapes and people are prone to the same alterations.

Cooper's use of the seasonal form reflected her desire to unite local detail with universal design and gave her easy access to natural theology. Seasonal changes, which manifest themselves in such trifling details as melting ice and chirping birds, were, according to the terms of natural theology, a general Providence of God. The natural laws that govern the seasons, the obvious manifestations of such changes, and the relative ease with which

those changes can be observed provided even the most casual observer with a map of the divine will. "Nature considered rationally, that is to say, submitted to the process of thought," as Cooper read in Humboldt's *Cosmos*, revealed "a unity in diversity of phenomena; a harmony, blending together all created things, however dissimilar in form and attribute; one great whole animated by the breath of life."[9] As D. L. LeMahieu observes, natural theology, a "theology of purposeful relationships," privileged reason and empirical proof over subjective emotions in its search for God. A reasoned excursion into the design of natural phenomena revealed not only the existence but also the character and attributes of the deity.[10] Although the minutiae of nature may seem trifling, Cooper knew that these details would become, through "sheer accretion," a unity in themselves, as Barbara Novak observes. These details would produce a panorama that revealed God and consequently would produce a "moral and social energy that could be translated into action."[11] For Cooper, this moral energy extended outward from the environment to the home, through the village, and into the nation.

Cooper's insistence on the moral imperatives encoded in the landscape relied on an understanding of the close connections between human and nonhuman families rooted in natural theology. Natural theology enabled humans to find in nature models for human action. This ontological system provided the underpinnings of the obviously (and relentlessly) domestic metaphors that Cooper used to describe the natural world. In *Rural Hours*, Cooper domesticates nature to reveal the close, morally infused, and reciprocal relationships between humans and nonhumans. Like Fuller, Cooper sees open communion between outside and inside as an ideal state, as when she revels in the habits of chimney swallows, which build their nests in unused chimney flues and eagerly "twitter about the roof of a house, giv[ing] it a very cheerful character through the summer" (*Rural Hours*, 35). While birds beautify the human home, they can also seek aid from humans, as Cooper poignantly illustrates in "Later Hours," an 1868 addition to *Rural Hours*. Cooper describes the plight of robins, molested by a chick-snatching hawk, who have "come to [her] for protection" and built a new nest among the antlers hanging over her front door. The nest, placed in "so trusting, so confiding" a position, demonstrates what Gaston Bachelard calls an "instinct for confidence in the world" that comes about both easily and only when nature is regarded as a place of morally bound relationships.[12] Were

it possible, Cooper would even extend linguistic boundaries to "talk robin to them," if only to "make them understand how safe they are—how little they have to fear—how very much we are their friends."[13]

Insects, flowers, and trees also play an important role in Cooper's domesticated nature. In their designed fitness for their natural environment, these objects make it possible to read moral lessons in their existence. Cooper employs a flower, the May-wing, for one such lesson for her readers. She writes that although the May-wing exhibits in its habits of growth an "innate grace," "a unity, a fitness, in the individual character of each plant to be traced most closely, not only in form, or leaf, and stem, but also in the position it chooses, and all the various accessories of its brief existence," it knows "nothing of vanity, its trivial toils and triumphs!" (*Rural Hours*, 53). This lesson of the woods would be well heeded by the "young girls about [the] villages," who are "often wildly extravagant in their dress, and just as restless in following the fashions" (*Rural Hours*, 99). Cooper also uses insect parallels to meditate on human character: a "cunning and designing man" is as reviled as a wily and suspicious spider that "lives by snares and plots." Cooper justifies her extraction of these moral lessons by recalling that even despised "insects must have their merits and their uses, since none of God's creatures are made in vain" (*Rural Hours*, 61–62).

Cooper's discussions of bird families, however, make clear the importance of natural creatures as models for human behavior. That birds of all species are everywhere in Cooper's text comes as no surprise, given ornithology's particular appeal for nineteenth-century women. The allure of these "honest creatures" lies in part in their mimetic function: the vigilant, selfless mother happily submits to "voluntary imprisonment" for her offspring, while her "remarkably good husband" cheers and provides for his mate (*Rural Hours*, 23, 20). By correlating the actions of bird homes and human homes, Cooper manipulates and extends the definition of *nature* to mean "home." The domestic arrangements of bird families produce ideal (and natural) societies, making them exemplary neighbors for human communities.

Although she revels in discussing birds' habits, Cooper is clearly enthralled by the delicate and intricate nests they create, as the architecture of the nest, built in anticipation of offspring, reflects an intimate domesticity. These nests also indicate the close and essential connection between the work of the home (preparing for offspring, for example) and the female

body. Describing the eider duck's nest, for example, Cooper explains that the "female plucks down from her own breast, for the purpose of making a soft nest for her young" (*Rural Hours*, 257).[14] Jules Michelet, a nineteenth-century French ornithologist, describes further the connection between the work of the female body and the form of the home when he writes, "On the inside [of the nest] the instrument that prescribes a circular form for the nest is nothing else but the body of the bird. It is by constantly turning round and round and pressing back the walls on every side, that it succeeds in forming this circle."[15] For Cooper, ideal human homes possess a similarly intimate nestlike quality that results from women's work. After visiting an ideally "rustic" farmhouse, she describes a home literally and figuratively insulated, like the eider duck's nest, by the work of the women inside: "The presses and cupboards of the house were still full to overflowing with blankets, white and colored flannels, colored twilled coverlets for bedding, besides sheets, table-cloths, and patched bed-quilts, all their own work" (*Rural Hours*, 98).

Cooper is very much invested in these idealized portraits of home and family, and her intent is clear: women should find such solace in their domestic arrangements. Despite the boldness of her text and of the demands she makes in its pages on behalf of the nation, Cooper remains a woman bound to the domestic space. "Home," she determines, "will always be, as a rule, the best place for a woman; her labors, pleasures, and interests should all center there, whatever be her sphere of life" (*Rural Hours*, 100). Indeed, she is most pleased when she sees industrious women "busy . . . beneath the family roof" because "the home system is healthier and safer for the individual, in every way" (*Rural Hours*, 99–100).

Cooper's "home system" adheres to what Nancy Cott identifies as the "social ethic" of nineteenth-century domesticity, a space where "mother, father, and children grouped together in the private household ruled the transmission of culture, the maintenance of social stability, the pursuit of happiness; the family's influence reached outward, underlying success or failure in church and state, and inward, creating individual character."[16] Although critics have shown the nineteenth-century notion of "separate spheres" to be largely an ideological construct as opposed to a real state, Cooper vehemently promotes that ideology in her writings, especially in later articles such as "Female Suffrage: A Letter to the Christian Women of America," a two-part tract in which she denounced efforts to promote the

"Emancipation of Women."[17] In this piece, Cooper argues that the "interests" of the public sphere are "too often simply contemptible—a wretched, feverish, maddening struggle to pile up lucre, which is anything but clean." "Where," she demands, "is the superior merit of such a life, that we should hanker after it, when placed beside that of the loving, unselfish Christian wife and mother—the wife, standing at her husband's side, to cheer, to aid, to strengthen, to console, to counsel, amidst the trials of life; the mother, patiently, painfully, and prayerfully cultivating every higher faculty of her children for worthy action through time and eternity?"[18]

"Female Suffrage" shows Cooper arguing against a woman's participation in the political realm, but despite her belief that a woman's position is "subordinate," her ideal domestic lady is decidedly not a frail, homebound invalid. Like her companion birds, who enjoy the "change of food, of air, of climate" experienced over the course of their annual migrations, so the domestic woman can experience a sense of "gratification" connected with "healthful, natural exercise" (*Rural Hours*, 220). And just as ideal bird mothers work to build safe and comfortable homes for their families, so Cooper never denies women the right to labor. But she is interested only in considering the "moral aspect" of that labor and not in discussing it as a "subject of political economy" (*Rural Hours*, 99). The emphasis on the moral rather than the political places Cooper's text directly in line with contemporary domestic literature, which exhorted women to "establish moral reference points in the home" by virtue of their "practices of work and family organization."[19]

Cooper's metaphor of gleaning explains how the writer understood female labor, both her own and others. The term *gleaning* recalls Judith Sargent Murray's *The Gleaner* (1798), an influential collection of essays advocating female education and economic independence. Murray encouraged women to seek economic autonomy, a position that Cooper agreed was often necessary for women in the absence of other forms of support. In *Rural Hours*, Cooper walks through the fields surrounding her town meditating on the absence of gleaners in the "New World" despite the economic importance of the practice for poor and laboring classes in Europe. Economic historian Peter King explains that gleaning "would have represented a major source of income" for women who found themselves on the margins of society, especially single women and widows. Most gleaners were women and children, whose physical labor contributed significantly

to their families' incomes.[20] The considerable physical hardship involved in the activity of gleaning is notably absent from Cooper's rendering of the activity, a lacuna that reflects, as Stefaniak observes, Cooper's position as "a middle-class woman removed from the primary activities of agriculture."[21] Because of her distance from the real work of gleaning, Cooper can liken it to other labors that she finds pleasant to watch—that is, birds gathering provisions for their young—and can thus naturalize gleaning as a gender-appropriate activity. Furthermore, by reminding readers of the biblical narrative of Ruth, gleaning the fields to provide for her family, Cooper also confirms the practice as a Christian activity. Since nature and by extension agricultural fields are moral spaces akin to the home, Cooper's "industrious woman" can, "without neglecting her family," venture abroad with children in tow and reap economic benefits from nature's bounty without danger of transgressing the limits of the domestic space (*Rural Hours*, 88). For Cooper, then, the "ungleaned fields" of Cooperstown, if anything, betray how far its inhabitants have fallen from her Christian ideal.

The interconnectedness of home and environment in Cooper's model governs the representations of both home and environment in the text. Nature offers a divine and fixed model for a human community that is continually in flux. Cooper's formulation recalls Emerson, who writes in "Nature" that the natural world is "the present expositor of the divine mind." "It is," he continues, "a fixed point whereby we may measure our departure. As we degenerate, the contrast between us and our house is more evident. We are as much strangers in nature, as we are aliens from God. We do not understand the notes of the birds. . . . We do not know the uses of more than a few plants, as corn and the apple, the potato and the vine."[22] Cooper, like Emerson, sees the order of the natural world as beyond human control, while at the same time objects in nature are continually subject to human whim and action. Specific instances where, for example, Cooper exclaims that were it not for a principle of restraint, she and her companions might have struck animals that crossed their path with their parasols indicate that the environment Cooper accesses always remains under human control (*Rural Hours*, 41, 178). That world remains invariably in Cooper's firm interpretative grasp as well; as a result, she is able to assign each individual object she encounters during her walks a functional definition or a specific role within a larger, well-ordered system.

Cooper makes clear early in *Rural Hours* that the model of nature as "a

harmonious system animated by spiritual forces" governs her reading of the landscape surrounding her home.[23] As a result, the text abounds with examples of God's Providence as expressed in natural mechanics. For example, a little sparrow in her path reminds her that both human and nonhuman creatures are ever "heeded and remembered before God" (*Rural Hours*, 259). The nonhuman occupants of Cooper's world also reveal through their "fitness" for their environment how humans should behave, teaching lessons in humility, fidelity, constancy, and comportment. She opens *Rural Hours* with an injunction for women to venture outside: "After facing the cold bravely, one brings home a sort of virtuous glow which is not to be picked up by cowering over the fireside." Interaction with the outside world invigorates the inside world, and Cooper assures readers that "the effort brings its own reward" (*Rural Hours*, 4). In the case of the observant adventurer, the effort of interacting with the natural world brings the reward of a deeper understanding of that world and an individual's place in it. Moreover, the walker in Cooper's excursive model experiences firsthand the fact of God's goodness rather than relying simply on speculation about that goodness.

Cooper concludes as much during a walk on a warm, cloudy, "sweetly calm" spring day (*Rural Hours*, 45). Walking far from the village, to a point where the meadows and woods "shut one out from the world," Cooper spends long hours contemplating the scene, with "nothing stirring but the river flowing gently past, and a few solitary birds flitting quietly to and fro." Such contemplation leads her directly to God: "At hours like these, the immeasurable goodness, the infinite wisdom of our Heavenly Father, are displayed in so great a degree of condescending tenderness to unworthy, sinful man, as must appear quite incomprehensible—entirely incredible to reason alone—were it not for the recollection of the mercies of past years, the positive proofs of experience" (*Rural Hours*, 45). Like Thoreau, who writes in *Walden* that his "sight has been whetted by experience," Cooper's discussion of the spiritual transformation effected by nature's redemptive work rests on tactile experience of the natural world. As air courses into the lungs and herbs are crushed underfoot, the observer/participant moves easily from "nature to nature's God," to borrow a phrase from Elizabeth Keeney.[24] But, as Christopher Manes observes, biblical exegesis teaches that the objects in nature are "mere *littera*," or signs that serve as an occasion for discovering "a moral truth established by God."[25] Thus, Cooper's springtime penitent necessarily turns for comfort from the "Word of God" to the

"Work of God." One sentence effects the transformation from Scripture to nature, from revealed theology to natural theology: "And, from the Book of Life, let the mourner turn to the works of his God; there the eye . . . will be soothed with beauty and excellence; the ear . . . will gladly open to sounds of gentle harmony from the gay birds, the patient cattle, the flowing waters, the rustling leaves" (*Rural Hours*, 46). Cooper draws on what Perry Miller identifies as the "correspondence of idea and object, of word and thing" to establish the necessary relationship between natural and revealed theology.[26] Since God both designs the natural world and provides a record of that creation in the Bible, natural and revealed theology must exist in harmony.[27] As Cooper notes, scriptural study or "reason alone," if divorced from the "proofs of experience" available in nature, renders the divine "incomprehensible" (*Rural Hours*, 45).

If this passage shows Cooper resting securely in her belief about the correlation between the narrative of the Bible and the corresponding proofs accessible in the natural world, other passages in *Rural Hours* show Cooper grappling with problems of representation and translation in the Bible itself. For example, willows spied during a spring walk inaugurate an inquiry into the willow of Psalm 137, resulting in one of the most rhetorically impressive passages of the text. Cooper opens her May 1 entry with a small complaint against the weather—"Showery; not so bright as becomes Mayday." Cooper's walking party is "obliged to be satisfied with following the highway," until, enticed "off the road into a low, boggy spot" by a bright cluster of marsh marigolds, Cooper spies a golden willow coming into leaf (*Rural Hours*, 30). Roads, sidewalks, and particularly fences often impede rather than promote Cooper's naturalist ramblings. In fact, she frequently complains when conditions require her to "plod humbly along the highways," since she prefers to roam the trackless expanses, experiencing nature free from prescribed definitions (*Rural Hours*, 288).

As she physically steps past the "rails of a meadow fence" and walks into the marsh, she metaphorically moves away from a culture that sees a "direct relationship between uncultivated landscapes" and uncultivated souls. Fences play a symbolic role in this view of landscape and, as Amy DeRogatis explains, serve both to "manage the land properly and to maintain boundaries to enclose the community of believers" within a specific interpretational and devotional mode.[28] Cooper, however, refuses to be confined by such modes. In this case, the physical move off the well-worn track

and into the boggy marsh mirrors the textual digression from describing the "native willows of America" to interrogating Psalm 137's "willows of Babylon, in whose shade the children of Israel sat down and wept" (*Rural Hours*, 31). The move from the track to the trackless initiates a move away from established interpretations and translations and charts a new definition composed of but still distinct from the writings she surveys. The willow passage records Cooper's process of discovery, which, as Gillian Beer notes, "is a matter not only of reaching new conclusions but of redescribing what is known and taken for granted."[29]

Cooper's knowledge of the habitat required to sustain a willow tree inspires her to ask a simple question: What kind of tree inhabits Psalm 137? Her inquiry in itself is not surprising: Beverly Seaton notes that such probing into biblical natural history was a popular pursuit throughout the nineteenth century, and interested authors readily provided their reading audience with books that detailed the flora of the Holy Land.[30] But Cooper's reading of the psalm as natural history meets an interpretative snag: "When we read of those willows of Babylon . . . we naturally think of the weeping willow which we all know to be an Asiatic tree. But the other day, while reading an observation of a celebrated Eastern traveller, the idea suggested itself, that this common impression might possibly be erroneous" (*Rural Hours*, 31). Is it a weeping willow, the tree mentioned most often in translations of the Bible, or is it a variety of the species more suited to the desolate landscape of Babylon?

After presenting her seemingly unassuming question, Cooper mines noted travel narratives of the region to get a picture of the habitat resources of the area and to look for clues to indicate the presence of the noble weeping willow. These recorded observations fail to satisfy her curiosity but instead lead her to demand "proofs clearly made out in behalf of the weeping willow" (*Rural Hours*, 32). Alas, she seeks to no avail. The only willow she finds mentioned is the "gray ozier," a tree deemed "insignificant in size, and of an inferior variety." She surveys the dimensions of the problem and confidently states that "the question may be very easily settled by those who have learning and books at command" (*Rural Hours*, 32). Cooper wastes no time in assuring her readers that she has such "learning and books" at her disposal, and she fills the next paragraphs with observations from such diverse sources as Herodotus, Abbe M. de Beauchamp, Robert Ker Porter, and two versions/translations of the Hebrew Bible. While her search fails to

provide the necessary evidence on behalf of the weeping willow, Cooper's careful survey convinces her that the lowly "gray ozier" is "thus proved, by the most clear and positive evidence, to have also existed there in ancient times" (*Rural Hours*, 32).

But why is this detail so important? The answer to this question becomes apparent in the concluding paragraph of the May 1 entry, where Cooper rewards patient readers with a meditation on the meaning and effect of the scriptural passage under scrutiny. She boldly proposes a third option here, a new translation composed of the writings surveyed but independent of the male writers she cites as her authorities, and she treats readers to an interpretation of the passage based on her new reading: "What sublime, prophetic power in those simple words—'who art to be destroyed'—when addressed by the weeping captive to the mighty city, then in the height of her power and her pride! That destruction has long since been complete; Babylon is wasted indeed; and we learn with interest from the traveller, that beside her shapeless ruins, stand the 'gray ozier willows, on which the captives of Israel hung up their harps'; mute and humble witnesses of the surrounding desolation" (*Rural Hours*, 33). The "common impression" of the noble weeping willow does not fit into this new interpretation of the biblical passage. The passage requires that the humble ozier, which both mimics the attitude of the captives and fits naturally into the desolated landscape of Babylon, stand next to the banks of the river.

Cooper's insistence on solving the riddle of the willow's identity pinpoints a moment of cultural tension, forcing her to ask if the Bible can be trusted despite empirical evidence that might disprove biblical narratives. She must establish the primacy of the Bible as the ultimate source for the nature observer for the scheme governing the apprehension of natural objects in *Rural Hours* to work. As she writes in the introduction to *The Rhyme and Reason of Country Life*, the Psalms, the Book of Job, and other biblical texts, written by "the priests and prophets of the One Living God, [who] beheld the natural world in the holy light of truth," provide the ultimate authority for the nature observer.[31] Cooper argues in her examination of Psalm 137 that the seemingly insignificant details of both species and translation constitute essential elements in an accurate interpretation of the Scripture. If the facts recorded in the Bible are wrong or misrepresented, then the "mourner" who looks from the "Word of God" to the "Work of God" will not find the two in harmony. Cooper neatly avoids the

deep religious and philosophical dilemmas that will surely result from this train of thought by focusing specifically on the Bible as a translated text. As such, the fault lies not in the representation of the natural phenomena but rather in the translations of that representation. In questioning the reliability of biblical translations, Cooper gestures toward the larger debates of the biblical "higher critics" (i.e., Johann Herder and J. G. Eichorn) who sought "to understand the Bible in natural terms rather than as an entirely supernatural record."[32] The Scripture, as a written record of a spoken word, they argued, should be treated as a literary text in critical analysis. The higher critics' inroads into the authority of translations of biblical texts make possible Cooper's investigations into alternative translations. She willingly offers the community her new translation of the biblical passage, which derives its authority from individual observation, not communal consensus. In so doing, she responds to what Gregory Clark and S. Michael Halloran astutely identify as the midcentury cultural shift in the locus of moral authority from institutions to the individual.[33]

Cooper applies science—specifically, the growing body of work in botanical geography—to prove the accuracy of her retranslation of the psalm. This branch of botanical study, in which Humboldt actively participated, examines the flora common to "distinct biological regions" and draws on the increasing awareness that environmental factors determine how and where plants grow.[34] Such information is critical to her argument that only a certain type of willow can grow in desert regions. Moreover, to establish the "truth" of the details related in the Bible, Cooper demands proof of an almost scientific nature. She constructs her discussion of the identity of the willow as a kind of scientific inquiry: she posits a hypothesis, seeks proof in empirical observation, and presents a new conclusion based on those observations. She must perform this examination because if natural theology fails—if the details observed in the natural world do not conform to a larger design inspired and effected by God—then the natural world similarly fails as a model for human actions. The moral lessons encoded in nature become meaningless if the foundation on which those lessons are based can be dismantled. A scientifically attuned eye, with its ability to unmask representational inaccuracies, can threaten Cooper's apprehension of her natural world. Yet as this passage shows, science, with its attention to empirical observation and classification, constitutes, in Keeney's words, "an ally, not an enemy, of religion."[35]

Cooper takes advantage of both natural theology and science, especially botany, to discern the significance of the biblical willow in this passage and thus reveals the tensions that run throughout the text. *Rural Hours* documents the author's efforts to unite increasingly competing ways of understanding the natural world: a religious view that regards the design of nature as a direct product of God made for the benefit of humankind and a scientific view that begins to present the world as a web of interrelated systems of which humans are simply a part. Although natural theology, with its reliance on order and fixity, works well with the artificial, taxonomic nature of Linnaean classification, which dominated botanical study well into the nineteenth century, Cooper, like most naturalists operating at midcentury, found the rigidity of Linnaeus's closed system incapable of accommodating the open-ended, organic metaphors that were coming to govern presentations and understandings of the natural world.[36]

The burgeoning idea of the environment as an organic system, a web of interrelated parts with a diverse past and an adaptable future, seriously strained the picture of the natural world as a divinely constructed, static entity. As Peter Bowler notes, discoveries in such areas as biogeography (geographical distribution of organisms), botanical geography, and fossil-based geology as well as prevalent theories of transmutation and other evolutionary notions that preceded Charles Darwin's *On the Origin of Species* (1859) acted together to remove God from the workings of the natural world. Cooper rejected this aspect of science even as she sensed that the traditional definitions offered by natural theology, which often overlooked detail in presentations of the design, were inadequate. Scientific advances—particularly geological discoveries that challenged conventional notions of the age of the earth and universe—placed enormous stress on the causal links on which natural theology depended, and science itself "came to symbolize the power of the human mind to dominate the material world."[37] Cooper found herself pressured to address nature as an exclusively scientific construct—an object to be observed, identified, investigated, and interpreted outside a moral frame.

As a gifted amateur naturalist, Cooper understood the real value of scientific research and language and often felt compelled to demonstrate her knowledge of this alternative system. She read current geological, botanical, and zoological texts and crafted descriptive passages that were as accurate as those of the naturalists whose works she both admired and sought to

emulate. Cooper also used the pages of *Rural Hours* to launch an excursion into the terrain of contemporary scientific controversies, such as those surrounding competing theories of glacier formation. Cooper's discussion of glaciers offers a clear example of the ease with which she moves intellectually outward from nature as object lesson to nature as object of scientific scrutiny and physically outward from Cooperstown to the world. After the previously discussed meditations on the similarities between snow and ice and "cold" hearts, Cooper betrays her global, scientific view by uniting her Highborough snow patch with those found in the Alps and the Andes:

> This handful of ice lying so late on Snow-Patch Hill, would doubtless prove, in a colder region, or among higher hills, the commencement of a glacier for it is on precisely this principle that glaciers are formed. . . . Let a snow-bank harden into ice by successive thaws and frosts, pass through one summer, and the next year it will be more than doubled in bulk, continuing to increase in size, and consequently in strength, until it bids defiance to the greatest heats of summer. It is in this way, that from the higher peaks of the Alps and Andes, covered with these vast ice mantles, five thousand years old, glaciers stretch far down into the region of grass and flowers, increasing rather than diminishing every year, since what is lost in summer seldom equals what is added in winter. (*Rural Hours*, 22)

This seemingly simple recital of glacier formation in fact reveals a complex understanding of contemporary debates concerning the formation of the great glaciers of Europe and South America. In 1840, Louis Agassiz rocked the scientific community with his Ice Age theory that postulated that a "catastrophic lowering of the temperature" of the Earth resulted in the creation of massive ice sheets stretching southward and covering most of the earth.[38] Many fellow geologists, notably Humboldt and Lyell, two of Cooper's key sources, rejected Agassiz's catastrophist approach. Lyell in particular complained that Agassiz's theory was at odds with Lyell's uniformitarian view, which regarded geologic developments in terms of a steady-state model—the earth, in its changes, continually seeks equilibrium and balance. Cooper's description of the development and movement of glaciers reflects her shared belief in this harmonious and balanced steady-state model. She crafts an analysis of glacier formation, like her retranslation of Psalm 137, that both suits her interpretative purposes and displays her knowledge of contemporary scientific debates.

Cooper's analysis of the Highborough glacier was clearly informed by her extensive reading of scientific texts. Cooper shares her passion for bibliographic references with her readers and on cold winter days turns to her library to deepen her knowledge of the species and habitat she might see if she were outside.[39] Significantly, Cooper considered herself a reader, not a scientist. Unlike later botanists such as Mary Treat, Cooper did not deem herself a peer of contemporary scientists, neither corresponding with nor (overtly) sharing her observations with them. This does not mean, however, that these professional men did not notice Cooper's nature writings. Notably, Charles Darwin was one such admirer: in an 1862 letter to Asa Gray, Darwin wrote, "Talking of books, I am in middle of one which pleases me, though it is very innocent food, viz, 'Miss Cooper's Journal of a Naturalist.' *Who is she?* She seems a very clever woman & gives a capital account of the battle between *our* & *your* weeds." In a letter written the following year, Darwin thanked Gray for sending him a native plant specimen (partridge plant), writing, "Positively the Mitchella looked as fresh, as if dug up the day before! What a pretty little creeper it is with its scarlet berries. Miss Cooper, I remember, mentions it."[40]

Darwin may have been charmed by Cooper's prose, but Cooper, who made no mention of him in her writings published after 1859, was perhaps not as taken with Darwin's evolutionary theories as put forth in *On the Origin of Species* and *Descent of Man* (1871). Darwinian evolution disrupted teleological models and denied the possibility of direction or design in evolution, ideas critical to Cooper's view of nature as moral exemplar. Although Gray worked hard in the American scene to reconcile evolution with design, most opponents understood that such reconciliation was impossible. And even though Cooper was dedicated to a view of nature that was threatened by scientific advances, she nevertheless willingly exposed that view to the critical lens of science. Fittingly, the scientific sources to which Cooper turns in *Rural Hours* fall on both sides of the Darwinian divide. George Cuvier and Agassiz were staunch anti-Darwinians. Lyell for several decades opposed Darwin's account of evolution on theological grounds even while admitting that his theories of fossil geology provided much of the impetus for Darwin's early work on the subject of evolution. Humboldt died during 1859, when *On the Origin of Species* was published, but his theories, especially his idea of the unity and harmony of natural processes, deeply impressed the young Darwin.[41]

At the same time, it would be misleading to suggest that because some of her key sources rejected Darwinian evolution, Cooper necessarily rejected any notion that evolutionary change was at work in nature and on the landscape. The view of both nature and culture displayed in Cooper's writings—especially her understanding of the adaptation of foreign plants and animals to new landscapes and her depictions of the advance of civilization across the landscape—certainly reveal a sophisticated understanding of the mechanisms of the natural world and the process of change occurring over time. Cooper saw nature in much the same terms as Humboldt, who, according to Robert Richards, "represented nature not as a stuttering, passionless machine that ground out products in a rough hewn manner but as a cosmos of interacting organisms, a complex whose heart beat with law-like regularity, while yet expressing aesthetic and moral values."[42] As Philip Sloan describes, Humboldt possessed a "vision of a comprehensive and holistic science of the natural world, a science concerned above all with *interrelated* phenomena—biological, geological and atmospheric."[43] Cooper relied on this notion of a cooperative, interrelated nature in *Rural Hours*, focusing in particular on the aesthetic and moral values displayed there. She borrowed liberally from her sources but refused to adhere to any one scientific view of the natural world.

Cooper's conflicted and often contradictory responses to science reveal the deep tensions caused by the intersections of the theological and scientific discourses that inform *Rural Hours*. She longed for the simplicity of a localized perspective but acknowledged the global movement of natural organisms. She presented sharp criticisms of the inadequacies of contemporary naming systems yet provided the same Latin terms she condemned as footnotes to her descriptions (*Rural Hours*, 52, 53, 64). She accessed scientific texts of all varieties to inform her representations of the landscape yet quarreled with professional naturalists' reluctance to accept "simple truth" in their creation of unnecessarily elaborate theories (*Rural Hours*, 167). Her scientific citations clearly indicated her familiarity with the debates raging around her, but like Phelps, Cooper adhered to the older model of harmonious nature despite its flaws and contradictions. And while she lamented that "little attention" had been paid to subjects such as entomology, she seemed uncomfortable with the increasing specialization of the sciences, which distanced amateur observers from the scene (*Rural Hours*, 174).

Regardless of her interest in science, Cooper was not prepared to relin-

quish her hold on the moral value of nature observation. As a result, Cooper, although versed in the language of scientific description, adhered to the meanings and morals expressed in popular sentimental botanies and floral dictionaries. The flowers she sees in the woods certainly mirror ideal attitudes and aspects: for example, the "squirrel-cups" of early spring possess a "timid, modest look . . . as if half afraid, half ashamed of being alone in the wide woods" (*Rural Hours*, 24). Weeds, conversely, with their "impertinent, intrusive character," their "want of modesty," and their "habit of shoving themselves forward upon ground where they are not needed, rooting themselves in soil intended for better things," teach, by their bad example, a "lesson of humility" (*Rural Hours*, 66, 65). Despite her facility with sentimental treatments of natural objects, especially flowers, found in the popular press, Cooper's understanding of them is not restricted to their sentimental value. And although she draws on the narrative forms of what Keeney calls "botanical natural theology" for many of her meditations on nature, Cooper uses *Rural Hours* to add her voice to a chorus of complaints against these texts.[44] Cooper would certainly have agreed with Elizabeth Wright, who scorchingly assessed the value of the language of flowers in *Lichen Tufts, from the Alleghenies* (1860): "If [its] piety, which it professes to teach, is as bogus as its botany, we wish it a speedy death, and a funeral sermon as profound as its own scientific researches."[45] Lucy Maddox notes that Cooper presents herself as a reader as well as a writer in *Rural Hours*; as a result, she assumes the right to discuss the "social and moral implications of what women read."[46] Sentimental flower books were insufficient as field guides because the numerous errors that peppered the texts made proper identification of flowers impossible. Nor could they function as devotionals. Descriptive inaccuracies would cause the individual observer of nature to doubt the veracity of her own observations and distract her from the contemplation of God. Cooper did not quarrel with the function of these texts as moral primers: after all, *Rural Hours* performs much the same tasks. However, she found fault with their form. Written by supposedly distinguished authorities, these texts carelessly overlooked details in their hasty presentations of nature.

Cooper continually turns her honed analytical eye to the texts that she reads. In a sharply critical entry, she takes "the distinguished" Martin Tupper to task for the observational inaccuracies in his *Proverbial Philosophy*, a "great work" that "has been a source of so much pleasure and advantage

to half the world" (*Rural Hours*, 72). In her June 15 entry, Cooper turns her attention to her "little neighbor," the hummingbird. In language that implies a long intimacy with the creature's habits, Cooper provides a brief description of the types of flowers most commonly frequented by the bird and notes specifically how the shape of certain flowers particularly suits it: "There is something in the form of . . . tube-shape blossoms, whether small or great, which suits their long, slender bills, and possibly, for the same reason, the bees cannot find such easy access to the honey, and leave more in these than in the open flowers" (*Rural Hours*, 71). She then turns to Tupper and the "pretty compliment" he pays to the hummingbird. "Personifying Beauty," Cooper writes, Tupper "says, she 'Fluttereth into the tulip with the humming-bird.' " Tupper's "compliment," however, does not imply any real understanding of the bird or its habits, as Cooper claims that after watching "the humming-birds for several seasons," she has not only "never seen one in a tulip" but also "often observed them pass these for other flowers" (*Rural Hours*, 72).

Although Cooper modestly notes that the error "may have been accidental" or that Tupper might have been referring to a variety of the bird with which she is not familiar, she defends her criticism by noting the fruits of her thorough observation: "There is something in the upright position of that flower which, added to its size, lends one to believe that it must be an inconvenient blossom for the humming-bird, who generally seems to prefer nodding or drooping flowers, if they are at all large, always feeding on the wing as he does, and never alighting, like butterflies and bees, on the petals." Cooper dismisses her complaints by calling them the "very trifling" points of "some rustic bird-fancier." But astute readers, recalling the rhetoric employed in the preface, will acknowledge the force behind Cooper's modest justification that "we are busying ourselves wholly with trifles just now" (*Rural Hours*, 72).

What troubles Cooper about Tupper's text is her impression that the mass of readers will trust this "distinguished" author and will become careless in their readings of the natural environment. By extension, Cooper worries about the lingering effects of floral dictionaries, decrying the fact that although "every young girl can chatter largely about 'bouquets,' and the 'Language of Flowers,' " these same children as well as the adults around them can seldom remember the "common names of plants they must have seen all their lives" (*Rural Hours*, 83). But if the excesses of traditional flower

languages obscured accurate observation and description of the local landscape, Cooper found the proliferation of Latinate terms in botanical texts equally problematic. Scientific terminology denied nature its poetry, and while Cooper appreciated the specificity scientific language allowed, she found problematic the artificial distance it inserted between object and observer. In her complaints against scientific naming, Cooper demanded to know how an observer/participant in nature could feel an impulse to act morally if thus distanced from the natural object. In this, Cooper responded to the burgeoning organic metaphors of the new sciences, which presented the environment as a complex web of open-ended relationships and replaced the constant and the fixed with the unexpected and the unpredictable.[47]

Despite Cooper's insistence on the primacy of the individual observer, however, *Rural Hours* provides a portrait of a communal space. Accordingly, Cooper privileges the rustic parlance that assigns flowers, trees, and animals names that reveal those objects' distinguishing communal characteristics. These expressive terms establish linguistic, historical, and cultural relations between the observer and the object observed. Local language domesticates the wilderness, and since Cooper saw moral energy as emanating from the home, such language makes the transition from the human home into nature's household an easy one. Science, with its "big books" and "long-winded Latin polysyllables," in contrast, removes the beauty and mystery from the natural world and distances the local folk from the plants around them (*Rural Hours*, 83). In her views on science, Cooper mirrors Emerson, who did not oppose "science *per se*," as Arnold Smithline writes, but "science which had forgotten the poetry of ideas in the assurance that the sensible fact . . . was sufficient."[48] She acknowledges the benefits of scientific study for a deeper understanding of the natural environment but warns her readers of the "additional weight of moral responsibility" that comes with "every new science introduced into the school-room" (*Rural Hours*, 228). That Cooper feels compelled to address the mechanistic impulse of Linnaean terminology as an "evil [that] is spreading over all the woods and meadows" indicates the degree to which scientific perspectives were being absorbed by the culture at large; in fact, Cooper warns "mothers and nurses" to teach the "pretty, natural names" of flowers to their children "before they are 'in Botany' " (*Rural Hours*, 83, 84, 87). *Rural Hours* checked the progress of that spreading evil, if only by serving as a valuable

record of those "unaffected" names before they became lost forever in the march of progress. Indeed, the careful documentation of both local and scientific plant names found in *Rural Hours* proved a valuable resource for late-nineteenth-century ethnobotanists such as Fanny Bergen, who referred to the text as a primary source of information on common names and uses of New York and North American flora.[49]

Rustic terms and local language encode and display the history of an entire community and give natural objects an identifiable place in the workings of human culture; the local community therefore has an equal obligation to fidelity in crafting its descriptive terms. Cooper believes that simplicity is paramount and, accordingly, that the best names for America's flora and fauna are honest ones that truthfully identify that item's form or function. She rails against names such as "chick wintergreen" for a plant that has "nothing in the world to do with chicks, or weeds, or winter" and celebrates those such as "gay-wings" for a flower that is "in truth one of the gayest little blossoms we have" (*Rural Hours*, 52–53). Rustic terms that recall "cherry-cheeked maidens, and merry-hearted lads" tromping through the woods and fields also make possible poetry and literature (*Rural Hours*, 84). Although Cooper provides readers with several exemplary passages from English authors such as Chaucer and Shakespeare, her demand for a local language expresses a determined nationalism and derives from her "wish that American poets should sing our native flowers as sweetly and as simply as the daisy, and violets, and celandine have been sung from the time of Chaucer or Herrick" (*Rural Hours*, 87).

Cooper's complaints about both the excesses of floral languages and the mechanistic impulses of Latinate botanies and her demands for accuracy in writing about nature indicate a larger concern for the moral and intellectual health of the American nation. In her eyes, the American people had failed to create an evocative language rooted in the local and the natural. Other writers of the American Renaissance echoed her laments about this wasted imaginative potential, warning that a country without a rich, descriptive tradition would find itself morally and aesthetically bankrupt. Cooper's descriptive passages, which synthesize observation and research, the individual and the communal, serve as examples of how she believes natural/national histories should be performed. Her investigations into translations of Psalm 137, her censure of Tupper's hummingbird passage, and her criticism of Latinate terms reveal the desire to craft a terminology

and an aesthetic that provides a "truthful description," a "correct picture of a landscape, a tree, a building"—and, by extension, a community (*Rural Hours*, 329 n.29). And a truthful picture of the Cooperstown landscape is precisely what Cooper imagines *Rural Hours* to be. Fittingly, therefore, the author employs the painterly aesthetic of the picturesque as a means of accommodating her desire for both descriptive fidelity and moral impact in representations of the landscape.

Cooper's use of the picturesque as an organizational device is not surprising given her close relationship with her father, James Fenimore Cooper, and his works—she acted as his literary executrix and advocated reprinting new editions of his works with her added editorial prefaces. The picturesque, with its reliance on artistic, visual aesthetics and its "awareness of the pictorial values to be sought in the natural landscape," dominated James Cooper's mode of representing the American landscape.[50] But Susan Cooper did not rely solely on her father's representations of the American wilderness when fashioning her response to the rural scenes she inherited from him. She wrote during that moment when the picturesque reached the height of its influence on American environmental writing and painting. The vastness of the American landscape, so threatening to colonial America, was, as Novak argues, in the process of becoming the locus of American culture and the "repository of national pride." Many people saw the suddenly tamer landscape as something to experience rather than subdue. Thus, American "nature" (cultivated, organized, controlled) supplanted American "wilderness" (wild, disordered, unrestrained) and metamorphosed into an "effective substitute for a missing national tradition."[51]

The revival of the picturesque aesthetic by American landscape artists, architects, and writers bore partial responsibility for the improvements in the accuracy of "descriptive writing, on natural objects" that Cooper notes in *Rural Hours*. She attributes this shift to an enlightened public's desire for something "more positive, more real" in the representation of nature (*Rural Hours*, 208). Halloran notes that the picturesque aesthetic demanded the observer's acute attention to visual detail in representations of the environment and depicted through "harmonious visual composition" "an inviting natural landscape touched lightly by human civilization."[52] For Cooper, visual representation (landscape painting, gardening) had a positive effect on poetic representation, as pastoral poets "began to look out of the window more frequently": "They turned away from the little porcelain shepherds

and shepherdesses, standing in high-heeled shoes and powdered wigs upon every mantle-piece, and they fixed their eyes upon the real living Roger and Dolly in the hay-field" (*Rural Hours*, 208). Many critics of the picturesque aesthetic, both past and present, contest reading the picturesque as creating a clear, detailed picture of the landscape, claiming instead that the picturesque imposes a narrative of national destiny over local details and leads to a distinct blindness to the realities of the landscape, especially labor and poverty.[53] In the instance of the pastoral poet, Roger and Dolly are not shown toiling after their sheep; rather, the poet seats them "under a hawthorn, or an oak of merry England" (*Rural Hours*, 208). Such representation obscures labor and displays leisure.

Cooper's picturesque representation of Cooperstown certainly is not exempt from these criticisms of the picturesque, as her privileged observer position depends on her status as a member of the leisure class. Labor and laborers become in the text objects that beautify or sully her view of both nature and nation. The validity of such criticism becomes apparent in her description of a typical farm scene:

> In our walk this morning, observed a large stone farm-house, with maples grouped about in most brilliant color; a party of men were husking maize in the foreground; a group of cows grazing, in one direction, and a cart with a pile of noble pumpkins lying in the other. It would have made a good picture of an American autumn scene. The coloring of the trees was just what one could wish for such a purpose, and the contrast with the stone house and gray barns was all that could be desired. (*Rural Hours*, 215)

Cooper's status as an observer rather than a laborer gives her the perspective necessary to delimit the real work of human and nonhuman laborers by creating a picturesque frame of reference. In this process, human, animal, and plant become equals, and their importance registers in the balance they create in Cooper's "good picture." As a result, despite her call for something "more real" in representations of the landscape, Cooper's farm scene remains largely an imaginative construct: the color of the trees are "just what one could *wish* for," while the contrasting colors of the stone house and gray barns are "all that could be *desired*."

Despite the valid criticism that the picturesque obscures labor, the aesthetic usefully enabled Cooper to unify the diverse components she saw in her landscape, something she could not accomplish with scientific lan-

guage alone. The picturesque encourages the landscape viewer to consider the artistic qualities and potentials of a vista and to provide that vista with a frame that organizes its disparate elements into a comprehensible whole. Alison Byerly calls the picturesque a "specific mode of pictorialism" in which "the viewer stumbles upon a scene or a prospect in which the elements are arranged 'as if' in a picture." The "apparently 'accidental' manifestation of the picturesque implies that the scene's properties are inherent, ready to be discovered." As her description of the farm demonstrates, Cooper's responses to the views she encountered on her walks often conform to the "conscious aesthetic framing of the landscape" that Byerly identifies as a key trope of the picturesque.[54] For example, Cooper entraps one prospect in an "archway of green branches, and between noble living columns of pine and hemlock" and gazes at the now-enclosed lake below her as "through the elaborate mouldings of a great Gothic window—a fine frame for any picture" (*Rural Hours*, 21). Cooper thus projects herself into an interior space and in the process subdues and domesticates her landscape by enclosing it within artificial structures.

But the presence of the observer of the picturesque scene is not, in fact, accidental; like the observer in *Rural Hours*, the picturesque spectator actively participates in defining and controlling the scene and infuses that accidental landscape with both history and moral significance.[55] The viewer's active role in constructing the landscape is most apparent in Cooper's meditations on the aesthetic as expressed in "A Dissolving View," her contribution to Putnam's lavish gift book, *The Home Book of the Picturesque* (1851), a popular volume of landscape essays and sketches. Writers including William Cullen Bryant, Washington Irving, and James Fenimore Cooper contributed articles, with illustrations provided by Jasper Crospey and Asher B. Durand, among others.

Susan Cooper's entry opens with a lengthy celebration of the "brilliant novelty" and "strange beauty" of the American autumn. The viewer's eye, which "never becomes wholly accustomed" to the scene presented, produces in the mind visions like those that Fuller experienced while standing at the brink of the Niagara cataract. History—specifically, the history encoded in the landscape—presses on the viewer, and in the "softening haze of the Indian summer," "images, quaint and strange, rise unbidden and fill the mind." But when Fuller writes about the frontier and the potential of a landscape threatened but not yet tamed, her visions necessarily evoke the

violence of the American past, a violence that might again haunt the nation. Cooper, conversely, writes of a scene that has already come under the controlling hand of human culture. Her gaze is that of a third-generation inhabitant of a land cleared and "civilized" by her grandfather and father. Cooper can evade the violent American past, the ghost that Fuller evokes, because her father has already mythologized that aspect of the settlement of the land. The good daughter can focus on the subsequent domestication of that landscape. As a result, Susan Cooper looks around and sees not savage Indians but in their place the "pillared cottages, the wooden churches, the brick trading-houses, [and] the long and many-windowed taverns."[56]

Nevertheless, Cooper shares Fuller's concerns regarding the "mushroom growth" that characterizes development in America. And as she observes the American scene from a hilltop vantage point, Cooper is not entirely pleased with the development she sees. She notes with disappointment that America, unlike Europe, where she spent much of her adolescence, has not produced an architectural or conservation ethic that will encode the culture's history indelibly in the landscape. Because the nation has not accomplished this task, Cooper, as the interpretative observer of the piece, will perform it for her readers, and she ends the essay with an imaginative act that literally transforms the valley below her into the picturesque "view of the valley in the condition it would have assumed, had it lain in the track of European civilization during past ages" ("View," 92). In this passage, the narrator participates in the production of what Ann Bermingham calls the "pure spectacle" of landscape aestheticization: because the view does not satisfy the narrator's aesthetic sensibilities, she performs an act of imagination that transforms that landscape into an ideal picture.[57] She gathers "a sprig of wych-hazel, and, waving it over the valley," watches as the "comparatively slight and fugitive" dwellings below her vanish "like the smoke from their own chimneys" ("View," 90, 91).

Not content with merely "razing a village," the narrator of "A Dissolving View" once more waves the witch hazel and watches as a forest and then a "mere hamlet" reappears below her. Cooper has no quarrel with the natural features of the American landscape and assures readers that these features "remained precisely as we had always known them; not a curve in the outline of the lake was changed, not a knoll was misplaced." Even the vegetation, she insists, "was such as we had been long familiar with, and the coloring of the autumnal woods precisely what it had been an hour earlier."

"But here," she remarks, "all resemblance ceased." Below her appear almost immediately "low, picturesque, thatched cottages," "a monument of some past historical event," "a castle of gray stone," "beautiful lawns and broad masses of woods," "the ruins of an ancient watchtower" rising from a far hill, and over all rose "the graceful spire" of the church, "the largest building in the hamlet" ("View," 92–93). The scene that she relates has all the necessary, conventional marks of William Gilpin's picturesque beauty, including "contrasts in light and shadow; rough textures, or 'ruggedness,' " "compositional unity within the varied elements of a scene," and "historical associations."[58] The picturesque eye organizes those varied elements into a unified panorama and allows Cooper to submit nature to Humboldt's "process of thought," revealing a cohesive narrative of nature and nation and showing the moral, cultural, and historical progress of a civilized community.

Rather than contradicting her nationalist tendencies, Cooper's fanciful act of investing the American landscape with a decidedly European quality serves as a stern reprimand to her culture, which she sees as determined to "pull down" its historical markers in its quest for "novelty" ("View," 89). Like Fuller, Cooper understands that the imagination cannot work alone but must work in concert with fact, and "A Dissolving View," like *Summer on the Lakes*, ends in disappointment. The narrator's reverie ends when a bee stings her hand and causes her to drop the witch hazel. The narrator sighs, "The spell was over; the country had resumed its every-day aspect" ("View," 94).

The elements of the constructed landscape of "A Dissolving View" take on a more specifically American nationalist perspective when read in conjunction with Cooper's comments about history and landscape in *Rural Hours*. Cooper's celebration of the American autumn in "A Dissolving View"—and her calculated retention of the distinctive American woodlands in her new landscape—stems from her delight with the effect the vivid colors of the season had on the eyes of America's poets and painters and the attraction that the autumnal northeastern woods had garnered among European tourists. She remarks in her lengthy discussion of the literary representations of the season in *Rural Hours*, "The march of Autumn through the land is not a silent one. Scarce a poet of any fame among us who has not at least some graceful verse, some glowing image connected with the season; and year after year the song must become fuller, and sweeter, and clearer" (*Rural Hours*, 209–10). Cooper's examination of

the pictorial qualities of the autumn scene leads her to turn her studied eye to its individual components. While her painterly appreciation enables her to take in the "magnificent picture [that] meets the eye," from the "woods that skirt the dimpled meadows" to the "trees which line the streets and road-sides," her training as an amateur naturalist allows her to distinguish the "brilliant scarlet" of the sumac's "long, pinnated leaf" from the "deep, rich red" of the flat-leafed oak and the orange linden from the "wrought gold" aspen (*Rural Hours*, 211).

Always the reverent observer who seeks to extract the moral significance from the scenes surrounding her, Cooper necessarily concludes her passage with a meditation on autumn's effect on the faithful observer: "In very truth, the glory of these last waning days of the season, proclaims a grandeur of beneficence which should rather make our poor hearts swell with gratitude at each return of the beautiful autumn accorded to us" (*Rural Hours*, 213). In this passage, Cooper produces a "fitting" blend of representational modes: her scientifically astute eye allows her to investigate the parts of the scene, her aesthetically informed glance enables her to create a unified whole from those parts, and her theologically rooted understanding of that whole empowers her to derive moral significance from the scene.

Beth Lueck and others note that the moral impact of the picturesque is a question that is "rarely considered in debates on aesthetics." Even Gilpin, noting the influence of picturesque beauty on the spectator, acknowledges that "if a *love for beauty* is not immediately connected with *moral* ideas, we may at least suppose that it softens the mind, and puts it in a frame to receive them."[59] Cooper, however, remains determined to extract this "moral tendency" from picturesque representation despite the fact that doing so often leads to contradiction in her descriptions of natural objects. Such contradiction is apparent in the May-wing passage. Cooper celebrates the flower's "unconscious, spontaneous beauty" while simultaneously noting that this beauty is controlled by the "position it chooses" (*Rural Hours*, 53). If Cooper is aware of the contradictory impulses present in her natural descriptions, she does not trouble herself with them, as they fall directly in line with the "theology of purposeful relationships" that governs her apprehension of the landscape. Cooper reminds her readers that God, not the individual, ultimately controls the design of the natural world, and she concludes the May-wing passage by recommending that readers "go out in the months of May and June into the nearest fields and groves, and

you shall see there a thousand sweet plants, sowed by the gracious hand of Providence, blooming amid the common grass, in crevices of rude rocks, beside the trickling springs, upon rough and shaggy banks, with a freedom and a simple modest grace which must ever be the despair of gardeners, since it is quite inimitable by art, with all its cunning" (*Rural Hours*, 54).

As her fanciful imagining of the progress from woods to thriving town in "A Dissolving View" demonstrates, Cooper invests the physical layout of her hamlet with a moral aspect that agrees with both her religious and her nationalistic principles. Cooper thus becomes much like an early pioneer, one of the "borderers of civilization in America" about whom her father might have written ("View," 89). Cooper's insistence that the layout of the town reflects the moral character of its inhabitants conforms to DeRogatis's notion of the "moral geography" of early colonial and frontier towns, where frontier missionaries considered "the physical layout of roads and towns and the constructions of churches and homes" a "litmus test for determining frontier settlers' habits and morals."[60]

If the national and devotional aspect of the developing town is a critical concern of Cooper's, the environmental one is no less so. Indeed, Cooper's ideal landscape demonstrates harmonious interaction between human and nonhuman, between the wild and the domesticated. On the walks she takes and records over the course of "a long, unbroken residence in the country," she celebrates both wild nature and rural cultivation (*Rural Hours*, 3). Thus while Cooper looks with pleasure on the rural and domestic scenes that dot the landscape, she also cautions her human neighbors about the "thoroughgoing utilitarian" who will always privilege profit over beauty. Although she believes, as she states in "A Dissolving View," that the "hand of man generally improves a landscape" (82), she modifies that belief with a warning that underscores the ecological principles that govern Cooper's understanding of a people's moral progress: "It is only when he endeavors to rise above his true part of laborer and husbandman, when he assumes the character of creator, and piles you up hills, pumps you up a river, scatters stones, or sprinkles cascades, that he is apt to fail" ("View," 82). The litmus test that Cooper applies to midcentury American communities ultimately measures in the burgeoning nation what Aldo Leopold would later call the "ecological conscience," or the "extension of the social conscience from people to the land."[61] Cooper demonstrates this nascent ecological conscience in "A Dissolving View" by constructing in the valley below her a village that

unites ideal compositional elements and reveals a human community living in harmony with its natural environment.

Nevertheless, Cooper's spontaneous expressions of wonder at the natural world are often mediated by her stark disappointment at the damage wrought by greedy human hands, and *Rural Hours* is punctuated by telling accounts of decimated animal and plant populations. As Michael Branch observes, *Rural Hours* "measures environmental loss nearly as often as it rhapsodizes on natural beauty." Branch understands Cooper's efforts to "document the devastation" wrought by settlement as an obligation to "count" environmental losses. Cooper lists an astounding number of plants and animals that have been "diminished or exterminated" by human action: "quail, pine, passenger pigeon, martin, pitcher plant, moccasin flower, fragrant azalea, hemlock, rattlesnake, mountain lion, ladyslipper, whip-poor-will, old-growth trees (all species), killdeer, crested woodpecker, blue gentian, deer, oak, moose, beaver, red-headed woodpecker, ruffed grouse, ducks, bass, large fish (all species), herring, panther, bear, pinnated grouse, white pelican, wolf, bison, fox, otter, fisher, wolverine, rabbit, hare, and squirrel."[62] Quail, for example, which had been "found here in abundance . . . have now abandoned us entirely," driven away by the fear of a civilization that marked its advance by the "sportsman's gun" (*Rural Hours*, 6). Cooper also records the disappearance of the passenger pigeon, which occurred over the course of the nineteenth century and was propelled, as Cooper writes, by the ever-present "sportsmen . . . shooting the birds as they pass over their heads" (*Rural Hours*, 10). Her grief at the disappearance of large flocks of birds is most apparent in her 1893 essay, "A Lament for the Birds," published in *Harper's*: "Who would have thought it possible that gentle birds like these should have swept over the interior of the continent within a century in flocks so vast as to obscure the sun at noon as though the country lay under an eclipse, while the ceaseless rapid motion of millions of wings produced a loud roar like an approaching tornado." Cooper is not merely being a sentimental, untutored rustic here—evidence of these populations is easily found in the works of "accurate and experienced men of science" such as Alexander Wilson and John James Audubon. She continues, "Since those years no large flocks of wild-pigeons have passed over Lake Otsego. . . . What a change within forty years! Alas for the vanished wild-pigeon!"[63]

If Cooper's outlook at the end of the century was tempered by the harsh

realities of species decimation, her view at midcentury was cautiously optimistic. Two passages clearly illustrate the move from exultation of nature to exhortation to care for it. At the beginning of *Rural Hours*, Cooper happily steps over a "fence blown down by some winter storm [and] stroll[s] the fields awhile" (*Rural Hours*, 6). But almost immediately after rejoicing in being able to walk "off the beaten track," Cooper recounts the "disappointment" that awaited her party: "Several noble pines, old friends and favorites, had been felled unknown to us during the winter; unsightly stumps and piles of chips were all that remained where those fine trees had so long waved their evergreen arms. Their fall seemed to have quite changed the character of the neighboring fields; for it often lies within the power of a single group of trees to alter the whole aspect of acres of surrounding land" (*Rural Hours*, 6). Rather than celebrating the reclamation of the field for agriculture, Cooper equates the death of these pines with that of a friend whose absence changes the landscape of the community. In this scene, which occurs early in *Rural Hours*, Cooper keeps to herself her thoughts about the type of person capable of such destruction. However, as she continues recording her thoughts, her indictment of the culture that perpetrates such damage becomes clear.

That Cooper loves the woods is palpable on virtually every page of her journal. Her lengthy entry for July 28, for example, begins simply, "Passed the afternoon in the woods." She makes her pleasure at being in the woods manifest when she immediately adds, "What a noble gift to man are the forests! What a debt of gratitude and admiration we owe for their utility and their beauty" (*Rural Hours*, 125). Utility and beauty together are essential both for the individual observer of nature and for the culture that requires the fruits of that nature to prosper. The structure of the July 28 entry reinforces this equal concern for utility and beauty, as Cooper leads readers through a discussion of how profit and pleasure can coexist in the American context.

Cooper, who rarely misses an opportunity to instruct readers in the proper moral response to the environment, first credits God for providing the nature observer with a safe haven, with a place to contemplate the goodness of the creator of those woods. As she begins to depict the numerous species that inhabit her woods, Cooper soon moves from a meditation on divinity to the value of the forest scene in the panorama of the American nation. These woods record the history of the American wilderness and

its cultivation. Just as Fuller senses the Indian foe of America's past while standing at the brink of Niagara Falls, Cooper's forest dweller can hear the echoes of "the fierce deed of the savage man, whoop and dance, triumph and torture" (*Rural Hours*, 127). Cooper experiences none of Fuller's solitary dread, however, as she can clearly see the "wonderful change" that sixty years of cultivation has wrought on the scene (*Rural Hours*, 128). The value of these woods is not limited to their function as recorders of American history, as trees "are connected in many ways with the civilization of a country" (*Rural Hours*, 133). Cooper respects the material value of trees and informs readers of the considerable profits trees generate in New York's rural communities, noting that according to the "State Reports for 1835," forest products yield "more [income] than the stock, and more than half as much as the farm lands" (*Rural Hours*, 133). But Cooper includes the statistical information that bolsters her claim as a warning to the "unsparing race" of woodcutters that nature's bounty is not limitless—prudence and cultivation are needed to preserve it (*Rural Hours*, 132).

In a long October 31 entry, Cooper makes explicit the connection between the care of trees and the education or "civilizing" of the populace. She describes a small hamlet "springing up" where a small tributary known as the Red Brook joins the river. The hamlet features a sawmill and a tannery as well as a schoolhouse, which Cooper identifies as the hamlet's best building in both construction and situation. But Cooper quickly reminds readers that this hamlet is in the early years of its development: although the site of the schoolhouse "easily may have been made very pleasant by merely leaving a few scattered trees here and there," these trees "have been all swept away to feed the saw-mill." Nor is the devastation complete: "The banks of the ravine, beautifully shaded only a short time since, are now becoming every day more bare" (*Rural Hours*, 223). Cooper acknowledges that early settlements must clear land for cultivation, but she also believes that when this "rude stage" has passed, a cultured people will seek to beautify their homes with natural ornaments: "In very truth, a fine tree near a house is a much greater embellishment than the thickest coat of paint that could be put on its walls, or a whole row of wooden columns to adorn its front." Conservation rather than destruction of the landscape reveals that a home, a community, a nation has become a "true civilization," and "when we have made this farther progress," Cooper writes, "then we shall take better care of our trees" (*Rural Hours*, 133, 134).

Moreover, the care of trees constitutes a tangible sign of the moral character of the citizens of a nation: "A careless indifference to any good gift of our gracious Maker, shows a want of thankfulness, as any abuse or waste, betrays a reckless spirit of evil" (*Rural Hours*, 134). Cooper shares this awareness of a people's "sordid" attitudes toward the landscape with Fuller, and like *Summer on the Lakes*, *Rural Hours* provides readers with two possibilities for the ideal America. But where Fuller's representations invariably end on a sad, frustrated, or disappointed note, Cooper's defense of the nation's woodlands ends on a hopeful one. The hamlet at Red Brook, for example, although a burgeoning town whose inhabitants continue to cut down rather than plant trees, "has *not yet* reached [the] point of progress." Cooper's narrative of evolution and progress indicates that the residents of the town will get there in time (*Rural Hours*, 223–24; emphasis added). Significantly, the key feature of the hamlet is its school; Cooper hints that an educated populace is exactly the kind that takes better care of its trees. In another striking passage, Cooper describes a "luxuriant elm, standing actually in the midst of the highway; its branches completely cover the broad track, sweeping over the fences on either side" (*Rural Hours*, 135). Cooper notes that the "thorough-going utilitarian," the lone traveler on America's highways, would "doubtless quarrel" with leaving the impressive if inconvenient tree standing in the way of progress. The townspeople, however, consider the tree a member of the community, and its use lies in the credit it brings to those who let it stand unmolested.

As Maddox aptly notes, *Rural Hours* completes the chronicle of the domestication of the Cooperstown landscape that begins with William Cooper's confrontation of the wilderness as recorded in *A Guide in the Wilderness* and continues with James Fenimore Cooper's records of the subjugation of that wilderness. *Rural Hours*, Maddox writes, provides "final documentation of the moral and cultural significance of the great undertaking" that "ends with the daughter's inheritance of a place that is no longer wild but comfortably rural."[64] Although Cooper inherited a place whose wildness had been subdued by the controlling hand of human culture, she sought to do more than merely record the comfortable, "simple events" of life in that inherited rural space. Indeed, in her complex and complicated text, she sought to fix meanings to natural objects during a historical moment when, as Paul Brooks describes, "the fundamental beliefs about the origin of the earth and man's place in it were shattered beyond repair."[65]

Cooper responded directly to these interpretative shifts in religion, science, and philosophy, despite her humble rhetoric, and *Rural Hours* records her successful struggle to find a descriptive language that could accommodate her competing desires.

Cooper's writings, moreover, gesture toward an organic (or proto-ecological) model of the natural world, and Cooper used *Rural Hours* to examine the intimate connections between human and nonhuman communities. But her conclusions were valid only in a world where nature retained a moral valance determined by the terms of natural theology. Although *Rural Hours* remained in print for several decades, the overwhelming popularity of Darwin's evolutionary theories and the subsequent remapping of the moral connection between humans and the natural world made her once cutting-edge vision of nature seem quaint and old-fashioned. Exciting new vistas opened up for women writing about nature in the post-Darwinian landscape. Women writers used the valuable tropes of domesticity that they inherited from writers such as Phelps, Fuller, and Cooper while reworking those tropes to consider new models of home and family. Despite profound shifts in the vision of nature prompted by scientific discoveries later in the century, Susan Cooper remained committed to her project, and she used *Rural Hours* to compel her readers to interrogate their perceptions and understandings of nature and to remind them of their responsibilities toward it.

CHAPTER FOUR

# Spiders, Ants, and Carnivorous Plants

## *Mary Treat and Evolutionary Science*

MARY TREAT (1830–93), a late-nineteenth-century writer and prolific naturalist of the New Jersey pine barrens, was both an inheritor of the trope of nature as home popular earlier in the century and an active participant in a scientific culture radically realigned by the advent of Darwinian evolution. As a writer of popular scientific nature essays, Treat portrayed the world around her small Vineland home as a rich field of inquiry for scientific investigation. In the process she reconfigured and extended the definitions of *home* and *morality* to include nonhuman occupants of the natural world according to Charles Darwin's terms. "To the lover, especially of birds, insects, and plants," she writes in the preface to *Home Studies in Nature* (1885), "the smallest area around a well-chosen home will furnish sufficient material to satisfy all thirst of knowledge through the longest life."[1] To readers surveying the diverse collection of essays gathered in *Home Studies in Nature*, Treat's affinity for nature's creatures seems boundless. An equal-opportunity naturalist, she bonds with all of the organisms that come under her purview—birds, bees, spiders, wasps, and ants. As she observes the natural world in and around her home, Treat blurs the lines separating human and nonhuman communities, and nature becomes not a model of the home but the home itself. Observing wild animals allows Treat to "domesticate" them, to bring them in and make them into participating members of an expanded household. The home that Treat constructs within the natural world features reciprocal relationships—if, for example, "the free bird of the grove" comes willingly at her call, then she must be equally willing "to be his servant and do his bidding" (*Home Studies*, 27).

It is easy to imagine the women for whom Treat wrote in this popular book embracing her model of cohabitation with birds; as Susan Fenimore

Cooper's *Rural Hours* demonstrates, birds had long held a special place in women's appreciation of the natural world.[2] On the surface, Treat's interaction with the birds simply represents a logical extension of the domestic metaphor: to observe truly the workings of nature, women must "marry" natural objects and concentrate their energies within a narrowly circumscribed space. It is harder to imagine her more ladylike readers welcoming the real consequences of this total dedication to understanding nature or to see them accepting the potentially subversive elements of Treat's essays. First, the author dedicated herself exclusively to her studies. Her writings about nature did not consider her own home and family, and she happily accepted the "hermit-like life necessary to accomplish" a deep bond with the creatures around her. In addition, she reveled in interacting with creatures that were typically reviled. Giant spiders, digger wasps, harvesting ants, and carnivorous plants occupy the central position in *Home Studies in Nature*. More importantly, Treat advocated a sophisticated brand of Darwinian evolution and embraced a model of the natural world that focused on the scientific rather than moral connections in nature. In a radical departure from Cooper's stance as a "gleaner," Treat openly acknowledged that she was a participating member of a famous and controversial circle of professional scientists that included Charles Darwin and Asa Gray, and she warned unsuspecting readers that she wrote first for a professional audience and only second for a popular one. It was clear, however, that she meant to hold onto both.

Treat enjoyed fame as a professional scientist but relied on her success as a professional writer to guarantee her income. As a frequent contributor throughout the 1870s and 1880s to the most influential literary magazines of the period, including *Harper's New Monthly*, the *Atlantic Monthly*, and *Lippincott's*, Treat's occasionally raw portraits of nature fit in nicely with the burgeoning demand for the "real" in literary representation. The keen interest in displaying nature in close and often brutal detail was shared by only a few other women nature essayists of the time, notably Charlotte Taylor and Sophie Bledsoe Herrick, who wrote essays in a similar vein to Treat's. These women's works also knowingly appealed to the growing discussions about science conducted in public forums such as lecture halls and magazines.[3] Treat understood her popular audience, and her more conventional essays on familiar topics such as bird families show her staying well within conventional bounds: she wrote from within the safe confines of

a clearly delimited domestic space, she trod well-worn paths in her essays on birds and flowers, and she invited her readers to share the observations of a fellow nature enthusiast. Yet when she ventured into the dark world of carnivorous plants, Treat abandoned both sentimental tropes and the disguise of an amateur and became a professional scientist who criticized the work of others (including Darwin) and staked claims for the originality of her research. Yet as a result of her real need to bridge the popular and scientific communities, Treat developed a complex understanding of the multiple roles her writing had to play to reach an audience, and the essays collected in *Home Studies in Nature* resembled narrative laboratory reports that simultaneously addressed both scientific and lay communities.

Treat distinguished herself from the earlier tradition of women writing about the natural world by her willingness to engage in a systematic and entirely absorbing examination of the natural world, by her investigation of nature based on scientific as opposed to moral principles, and by her active participation in current debates within a community of professional scientists. This chapter investigates how Treat, a scientist and writer, responded to several significant events that contributed to the decline of the kind of expansive investigations into education and perception, nature and nation, that characterized texts such as Almira Phelps's *Familiar Lectures on Botany*, Margaret Fuller's *Summer on the Lakes*, and Cooper's *Rural Hours*. These events included the rise of women seeking employment outside the home in professional scientific fields and the rise of realism as a literary aesthetic.

Of course, the most significant cluster of events affecting how nature was seen and written about in the late nineteenth century was the publication and dissemination of Darwin's *On the Origin of Species* in 1859 and *Descent of Man* in 1871. It would be hard to overstate the impact of these two works on the understanding and representation of nature in the late nineteenth century. While evolutionary ideas had been circulating around the culture for a while before Darwin published his account of natural selection and species adaptation, he was among the first to use the tools that women writers such as Phelps, Fuller, and Cooper so valued—accurate observation coupled with precise description—to sever the ideological links between theology and nature.[4] These writers acknowledged the pressures scientific discoveries placed on these links, but before Darwin, they successfully navigated the uneasy truce between science and divinity by using

scientific texts, such as Johann Wolfgang von Goethe's *Theory of Colors* and Alexander von Humboldt's *Cosmos*, that were sympathetic to their view of nature. By the end of the century, however, branches of science previously united under the rubric of natural philosophy had fragmented into discrete disciplines. The new field specialists, who debated the particulars of nature as opposed to its divine order, openly expressed hostility toward these older approaches. Unlike her predecessors examined in this volume, Treat welcomed this intellectual shift and positioned herself and her studies at the forefront of the new scientific understanding. She allied herself with Darwin and embraced both the terms and the methods of his investigations.

Darwin's explication of the mechanisms of evolution informed Treat's writing in a manner different from the way Linnaeus's botany, Goethe's color theory, and Humboldt's natural philosophy structured Phelps's, Fuller's, and Cooper's understanding of nature. For these writers, science specifically constituted a structure, providing a system under which individual elements in nature—a plant, a tree, a bird—were assigned fixed meanings. Although Cooper bristled at the rigid taxonomy of Linnaean plant nomenclature and Fuller struggled to free her imagination from the limits of a formula, each writer nevertheless relied on that taxonomy, on that formula, as the baseline for her own departures. For Treat, these fixed links were gone, and science could no longer be considered a secure framework on which to hang her sundry views on nature. Instead, Treat actively constructed a definition of home under the new paradigm of a nature "red in tooth and claw." Although scientists and writers had reached little consensus regarding how to organize the natural world in the face of Darwin's conclusions, the methods and principles of Darwinian thought provided Treat with a vocabulary on which she relied to explain very specifically what was occurring around her.

Treat's observations took the form of carefully crafted, objective, and regulated experiments, and her essays resemble narrative laboratory reports that engage both the armchair naturalist and the trained botanist. Each essay begins with a succinct presentation of the problem at hand, proceeds with an acknowledgment of the sources she consulted in her research, continues with a record of her observations of the subject under investigation, and ends with a presentation of her conclusions. If the structure of each essay indicates Treat's familiarity with the form of scientific inquiry,

then the language used in the investigations and the organization of the essays collected in the text demonstrate the range of the author's knowledge and reveal a sophisticated understanding of her audience. Treat welcomes a popular, lay audience to participate in her queries by using language and images, such as traditional metaphors of home and family, that will appeal to this wide public.

The essays in *Home Studies in Nature* show that Treat was more than just one of Darwin's occasional correspondents. Rather, she was one of the few popular woman writers of the time to advocate a sophisticated brand of Darwinian evolution, and she embraced a model of the natural world that focused on the scientific instead of the moral connections in nature. The essays are cannily organized to ease readers into what will at times be a disturbingly up-close view of the natural world. The lavishly illustrated text is divided into four sections, each of which collects a variety of essays on similar subjects. The first section, "Observation on Birds," contains two essays, "Our Familiar Birds" and "Our Winter Birds." In these opening chapters, Treat outlines the bias that helps her organize her observations of nature—specifically, that of seeing the natural world as a web of distinct yet interrelated communities. Harmony among members of those communities is not a given, however, as a human "cannot discuss . . . matters" with the nonhumans around her. Instead, the good observer "must patiently investigate their work, and thrust [herself] upon the privacy of their domestic arrangements" if she cares to "know intimately the life and habits" of animals in the wild (*Home Studies*, 68).

Treat's opening chapters instruct readers in becoming "good observers." In the next section, "Habits of Insects," readers learn how to apply these techniques in controlled experiments on the crawling and flying creatures around them. The daily life of the insect world that Treat illuminates for her readers is a peaceful, familial one in which spiders, ants, and wasps build nests in which to bear and rear their young. It is also a vicious, violent world full of war, danger, and death, as predators threaten and occasionally destroy these same nests. Readers looking for more conventional representations of the natural world might find the third section, "Plants That Consume Animals," even more disturbing than the chapters on insects, especially since Treat at one point volunteers her own finger as food for a flesh-eating plant. In these essays, she forcefully presents herself as a

successful scientist whose observations have produced better results than either Gray or Darwin has obtained.

Treat ends her book by rewarding resilient readers with a return to more comforting subjects—flowering plants of the Florida marshes. At the same time, Treat maintains her position as professional scientist, using the essay to detail her discovery of a rare lily. In her essay, "Life in Florida," Treat describes coming upon acres of "beautiful white lilies . . . thickly scattered among the grass" during one of her excursions along the pine barrens of the St. Johns River (*Home Studies*, 218). She closely examined the plants' leaves and determined that they did not resemble any lily that she recognized. She "sent the plant to the Botanic Garden at Harvard, where it was pronounced a new species." This discovery constituted a coup for Treat and solidified her standing among the Harvard botanists with whom she corresponded. Treat received credit for her find and adds, in her essay, that it was "named by Professor Watson *Zephyranthes treatiae*."[5] Finally, Treat informs her readers that "the florists advertise it . . . under the name of *Amaryllis treatiae*"—important information in case any of her readers want to honor her in their home gardens (*Home Studies*, 218).

Treat's recognition by the Harvard botanists did not come easily, as she initially had to overcome their reluctance to engage with a female amateur botanist. Indeed, Treat surmounted what Margaret Rossiter identifies as the "contradiction" of the woman scientist, caught between the "two almost mutually exclusive stereotypes" of "woman" and "scientist."[6] Two nineteenth-century descriptions of Treat illustrate this contradiction, presenting to the public two very different portraits of Mary Treat and her work. Historian John Harshberger identifies several of Treat's more notable scientific accomplishments in his brief biography but ends his description by placing Treat squarely within the home: her "most prominent characteristic is a modesty so shrinking as to make any public recognition of her services painful to her, while her joyous enthusiasm for her chosen life-work is so great and so contagious that her home is always the centre of attraction, where are welcomed all who come to learn even the alphabet of her beloved book of nature, and where she dispenses the bounty of her gifts and attainments with a modest lavishness and an unwearied patience, which appear to be to her their own reward."[7] Naturalist Charles Darwin, however, describes Treat differently in his seminal work on flesh-eating plants,

*Insectivorous Plants*: "Mrs. Treat, of New Jersey, has been more successful than any other observer, and has often witnessed in the case of *Utricularia clandestina* the whole process. [Her] excellent observations have already been largely quoted."[8]

Harshberger's description controls Treat, placing her firmly inside the domestic realm and narrowly circumscribing her by emphasizing her overtly feminine and therefore lovable characteristics: she is modest, delicate, emotional, noncompetitive, and nurturing.[9] This rendering obscures Treat's active qualities as an accomplished botanist, entomologist, and ornithologist, and she becomes merely a passive reader of the book of nature, a teacher only—and not even a professional one at that. Darwin's account moves in the opposite direction. It takes Treat out of the home, privileges her skill as a professional, and places her in a dialogue with a circle of established scientists. At the same time, this description and Treat's published accounts of her work suggest that she conforms to the stereotype of the scientist that Rossiter identifies as "rigorous, rational, impersonal, masculine, competitive, and unemotional."[10] Could Treat be both the domestic lady and the accomplished scientist?

At first glance, Treat seems also to have wanted to present an image of herself as a modest domestic lady. Like many other nineteenth-century women writers, she opens the preface to her collection by promising her audience that she had initially intended to keep her nature observations to herself: "Many years ago, when I began my studies in Nature's open book, I had no thought of ever giving them to the public." But the similarities between Treat and the shy, retired, domestic woman sharing her thoughts by the fireside end shortly after this conventional line. The author takes firm control of the narrative and boldly proclaims that during her "studies in Nature's open book" she found "so many things new to me, and some new to science, that my correspondents, especially those engaged in similar pursuits, urged me to publish the result of these observations" (*Home Studies*, 5). She uses the preface to authorize herself by providing a record of her publishing history: "Some of them were printed in scientific journals, but as the interest deepened, the wish came to tell a greater number of readers what I saw around me, and I therefore sent notes of my investigations to some of our popular periodicals, mostly to *Harper's Magazine*, and this volume is composed mainly of these papers" (*Home Studies*, 5). Treat had been alerting her readers to the results of her plant studies for some time; her

interest in publishing appears to have begun as early as 1864, when she contributed grass specimens for an article in the *Horticulturist*. Treat became well known to the magazine audience—so much so, in fact, that editors frequently contacted her with article requests. Her earliest articles, a three-part series on "Botany for Invalids" (1866) published in *Hearth and Home*, reveal her adhering to and recycling popular arguments about the value of botanical study for "weak, nervous, dyspeptic invalids," arguments that Treat most likely heard from Phelps's *Familiar Lectures* as a young botany student.[11] By the late 1860s, however, Treat was publishing the results of original research in respected scientific journals, and her work attracted the attention of America's leading entomologists, Benjamin Walsh and Charles Riley, who nominated Treat for membership in the American Association for the Advancement of Science in 1870. Treat's publishing career spanned an extraordinary forty-six years, during which time she wrote six books and more than one hundred articles on topics as diverse as white grub fungus and pine barren vines.

Treat's presentation of herself and her work in the prefatory remarks to *Home Studies in Nature* mirrors the seeming contradiction uncovered in the quotations from Harshberger and Darwin. She confirms her position as a domestic woman performing role-appropriate observations of the familiar birds and flowers in her proximate world while simultaneously presenting herself as an accomplished scientist involved in a range of scientific investigations. The opening line of the first essay of the collection, "Our Familiar Birds," subtly reveals the balancing act that Treat performs as domestic woman and professional scientist: "During the past summer my time and attention have been devoted almost exclusively to the birds which nested around the house" (*Home Studies*, 15). Even though Treat's scientific studies take up all her "time and attention," she reassures her audience that she has stayed well within her domestic bounds while conducting the investigations mentioned in the preface, and she welcomes these lay readers into her home by giving them a detailed description of the place: "The house is situated on the main avenue, near the business part of the village, and is surrounded by a thick grove of native oaks and other trees. Back of the grove is a fruit orchard, extending to the next street; between the grove and orchard is the shrubbery—a dense mass of various flowering shrubs. Climbing plants cling about the piazzas in tangled luxuriance. Surrounded as the place is by the din and hum of business, yet on the grounds it is very

quiet" (*Home Studies*, 15). Treat's home represents the nineteenth-century domestic ideal—a place marked by its perfect fusion of outside and inside, industry and sanctuary, home and nature. Nature has been tamed, and she encourages readers to tour the grounds with her as she identifies with charming assurance the variety, habits, and nest patterns of the many birds that call her orchard home. Her descriptions call to mind Susan Cooper's bird families: "The elegant scarlet tanager (*Pyrangea rubra*), with its more soberly attired mate, constructed their frail tenement in the most retired part of the orchard, on the forked branch of a plum-tree. . . . This graceful and brilliant bird is quiet and unobtrusive . . . yet his attachment to his mate and young made him at times quite bold and fearless" (*Home Studies*, 17).

By defining the physical parameters of her field of inquiry as "the grounds connected with the cottage where I reside," Treat aligns herself squarely with amateur nature enthusiasts and consciously sets herself apart from the "expert naturalists" who feel the need to venture into grand landscapes to claim discoveries of natural objects (*Home Studies*, 207). And as the title of the collection indicates, Treat is keenly interested in studying the home in nature: she wants to know how insects and animals build their homes and structure their communities. As in the description of the scarlet tanager, many of her investigations (and the conclusions she draws) are firmly in line with a conventional domestic ideology that places the female—human or nonhuman—in the domestic space.

Treat writes for her popular audience from within the confines of this domestic ideology, although her research is not limited by it, and she constructs a domestic space that conforms to her role as a practicing scientist. She encourages her readers to do the same by suggesting that the materials to construct a home laboratory are close at hand. Even though Treat's articles rarely show her venturing far from her yard, under her skillful eye (and by her concerted efforts at importing species), Treat turns this apparently safe area into a foreign land populated by the mysterious creatures whose habits she wishes to learn. To accomplish this transformation, Treat turns her house and yard into an active laboratory. Her world features fluid borders between outside and inside: birds nest in the eaves of her porch; "pet" spiders live in jars in her study; digger wasps inhabit her backyard "arachnidan menagerie"; and carnivorous plants ingest their prey in her living room (*Home Studies*, 86, 113).

A brief comparison of Treat's account of her living room and Phelps's description of the ideal parlor of the educated lady indicates how far Treat is from the student Phelps imagines. According to Phelps, "It is important to the cause of science, that it should become *fashionable*; and as one means of effecting this, the parlours of those ladies, who have advantages for intellectual improvement, should more frequently exhibit specimens of their own scientific tastes" (*Lectures*, 31–32). Treat understands her parlor differently, or perhaps she understands perfectly how the parlor should function: as a semiprivate space, it is a place of safe social interaction where the home has to a degree been sanitized for public consumption. Treat acknowledges that what occurs behind her closed doors (scientific investigations) may cause discomfort among some of her guests, even those who double as pupils. As she explains in the essay "Spiders and Wasps," Treat anticipates and accommodates her public's delicate sensibilities in the manner in which she displays the objects in her parlor: "I capture [spiders for investigation] by cutting out the nests with a sharp trowel or large knife, and have ready some glass candy jars from twelve to fourteen inches in height, in which I carefully place them. I then fill in with earth all around . . . and cover the surface with moss, introducing some pretty little growing plants, so that my nervous lady friends may admire the plants without being shocked with the knowledge that each of these jars is the home of a large spider" (*Home Studies*, 86).

Treat's parlor, the site of her professional, private, and social activities, merits comparison with the parlor of the Courland sisters in Catherine Maria Sedgwick's "Cacoethes Scribendi." The social space of the parlor, which functions as a community gathering place before the sisters begin writing, languishes as they embrace their new professional careers. The disrupted parlor is righted only with the announcement of a marriage, of a return to a conventional domestic (and economic) arrangement. Treat shares affinities with the Courland sisters—she lives alone after becoming estranged from her husband and like Miss Anne shares observations of the natural world with a reading audience. But Treat succeeds where Miss Anne fails, achieving the status and fame that Miss Anne denies herself when her professional objectivity is lost and she destroys "in a fit of joyful agitation" her newly discovered flower. Furthermore, Treat keeps her parlor in right order rather than letting it fall into shambles as do the Courland sisters, and she willingly disguises the professional activities that take place there

from the eyes of her "nervous lady friends." As a result, her home maintains the reputation that the Courlands' loses and is regarded as "a centre of attraction" in the community.[12] At the same time, Treat maintains her standing outside that local circle as a professional scientist whose home also serves as her laboratory.

The contradictions that Treat attempts to overcome in her studies are revealed in the essay "Ground Spiders." Treat offers readers descriptions and drawings of the "Insect Menagerie" that she has constructed in her backyard. The illustration of the menagerie is particularly important. Finely detailed illustrations were essential ingredients of most magazine articles of the period, and Treat's audience, especially those versed in popular nature writing, would have been knowledgeable in the language of these illustrations. Most flower language books of the time were replete with lavish images that aided readers in identifying particular blossoms. Scientists and explorers relied on detailed illustrations to make the unfamiliar familiar. Botanical educators also stressed the need for carefully documented records of botanical finds, sharing with Margaret Fuller a belief that true understanding came only with the recording and reproduction of things learned. Popular nature essayists such as Taylor and Herrick illustrated their own works, producing gloriously detailed line drawings of spiders with articulated legs and hairy bellies and pitcher plants ingesting tiny animals. Indeed, many women found work as illustrators, as male scientists often capitalized on the skills of scientifically inclined women who produced delicately detailed figures.[13]

Treat also recognized the value of illustration and indicates to readers that because knowledge is gained by looking at the world rather than merely by reading about it, the images must be attended to with care and attention. In a striking use of illustration, readers are first introduced to the idea of Treat's outdoor spider observatory by a picture showing the author seated comfortably under the shade of a tree near the center of a circular hedge (see figure 4). The hedge appears to be low and the circle small relative to the seated figure, and the world outside the circle is vague and ill defined; this outside space appears as an unknown, outside the reach, ken, or even interest of the woman seated within the circle. The space within, conversely, is clearly presented—small glasslike objects dot the ground, and a pedestaled basin sits opposite the tree. The image is placid, calm; the seated woman is protected from the world outside the hedge. Her head is

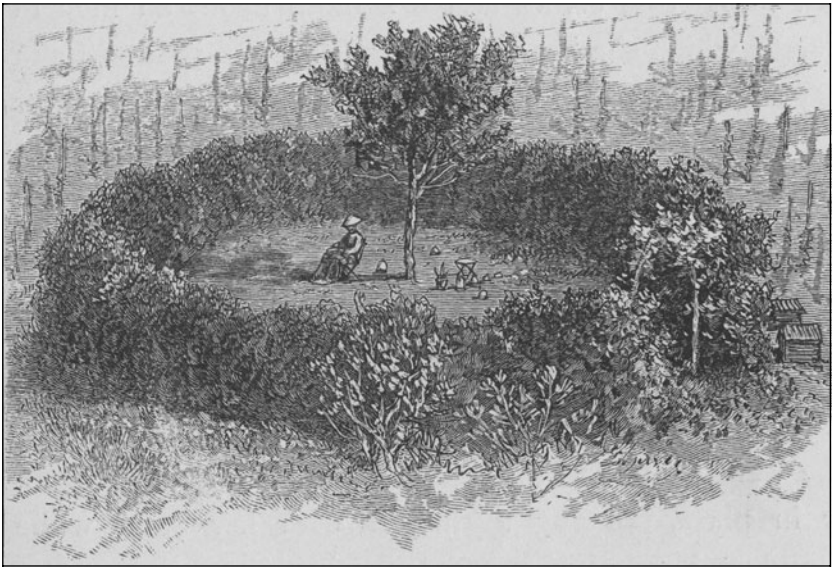


FIGURE 4. The Insect Menagerie. The spider specimens Treat collects here were either gathered by the author during one of her many excursions or were sent to her from entomologists from around the country. From Treat, *Home Studies in Nature*, 112.

down, her hands lie in her lap, and she appears to be resting. From such illustrations it is easy to read Treat's insistence that home and garden are arenas for nature study as both ready acceptance of and vocal support for a conventional understanding of a woman's place in the home, as several critics have done.[14]

Even so, gentle readers might become quite disconcerted after discovering the creatures that share this woman's hedged-in space. The care involved in creating the menagerie and Treat's joy in the space and the creatures it houses shine through her description of them, which she provides in the course of discussing her experiments with the ground spider, *Lycosa carolinensis*:

> Fine specimens of this large spider were expressed to me from New Hampshire, and are now hibernating among a host of their relatives in my arachnidan menagerie. My menagerie is enclosed with a dense circular hedge of arbor-vitae, fifteen feet in height and a hundred and fifty feet in circumference. In the centre is a maple-tree with drooping branches.

> Ornamental plants are scattered about, and two bird baths are prettily arranged—large, shallow, earth-colored pans are set into the ground, and graceful twining plants are festooned above them. The birds seem to appreciate these cool, pretty baths, and their splashing keeps the earth so moist that the plants grow luxuriantly all about them. In this retreat I have brought together a large number of burrowing spiders, whose habits I wish to investigate, and to do this successfully, I must devise some means to keep them intact from their enemies. . . . I set [small glass ovals] over each burrow to keep my pets from the ravages of their relentless enemy, the digger-wasp. (*Home Studies*, 113–14)

Giant, hairy spiders, murderous wasps, and playful birds reside in the circle with the seated figure even as Treat glosses the scene with terms such as *ornamental*, *prettily*, and *festooned*. In a later chapter, readers also learn the habits of another group of creatures who live literally under the woman's feet—a species of harvesting ants "whose subterranean city is beneath the spreading branches" of the maple tree (*Home Studies*, 121).

Treat's written description of the menagerie qualifies the information conveyed first in the illustration. The hedge of arborvitae is not low, nor is the circle small—at 15 feet in height and 150 feet in circumference, the space is large enough to shut the willing scientist completely away from the space outside. The vaguely defined world outside the circle (home, family, society) in the illustration is a space about which the solitary woman within the circle chooses not to know. The scientist/author's "retreat" is pleasant in a conventional way, complete with ornamental plants and chirping, splashing birds. Yet even the birds are valued for more than their aesthetic appeal; their actions provide a useful service and help maintain the ideal habitat for the "large number of burrowing spiders" she has "brought together" in this place (*Home Studies*, 114). Treat's description indicates the multiple roles she plays: she is both the scientist who conducts experiments on the creatures around her and the protective mother who creates a home and guards her charges.

The interplay of illustration and description reinforces the contradictory position of the woman scientist and indicates just how far the author is from the ideal domestic lady that Phelps envisions and Harshberger describes. The illustration of the menagerie in part confines Treat physically in the home space in much the same way that Harshberger's description

restricts her intellectually. Yet the accompanying text frees her from those constraints. A similar tension is at work in other illustrations in Treat's articles. Many of the illustrations act as reader's aids, offering visual descriptions of the homes, families, and habits of the exotic species of spiders she collects (see figure 5). Investigating ground spiders, for example, Treat does not hesitate to describe in graphic terms the violent world these creatures inhabit, as in her description of a spider killing its prey: "The spider would get astride [the moth], and hold its wings down with her legs, and pierce it with her mandibles until it was dead" (*Home Studies*, 96). At other moments, Treat resorts to traditional metaphors of home and family to describe her subjects' domestic behavior, often rendering the metaphors graphically in accompanying illustrations. In one striking example, Treat describes how a spider mother picks up some of her children and holds them "straight in front of her . . . perhaps giving them a homily on manners" (*Home Studies*, 104–5). The accompanying illustration (figure 6) shows the body of the female spider literally subsumed by her offspring, as a mass of baby spiders rides her back. Treat gleans no moral lesson from the objects of her investigation; the spider mother only "perhaps" gives her children a homily on manners. Treat also does not use these instances to instruct readers regarding their behavior but simply lets the act stand for itself. In this, Treat distinguishes herself from the domestic woman looking for connections among human, natural, and divine homes.

Treat readily admits to an all-consuming interest in a specific knowledge of the natural world: her writings about nature never consider her home and family, and she accepts the "hermit-like life necessary to accomplish" a deep bond with the creatures around her. Although she rarely shares this information with her reading public, Treat's letters to her scientific correspondents are replete with accounts of fording streams and slogging through marshes in her pursuit of rare specimens and of suffering chills, headaches, and fever from long nights observing them under her state-of-the-art microscope—hardly the genteel botanical excursions that Phelps planned for her botany students.[15] Treat describes to Harvard botanist Charles Sprague Sargent one such expedition to a Florida marsh in search of a rare lily, bringing to mind Fuller, who lamented that she was denied the physical challenges that Treat readily undertook in the name of scientific investigation. Treat, moreover, informs readers in the opening line of *Home Studies* that her "time and attention have been devoted almost

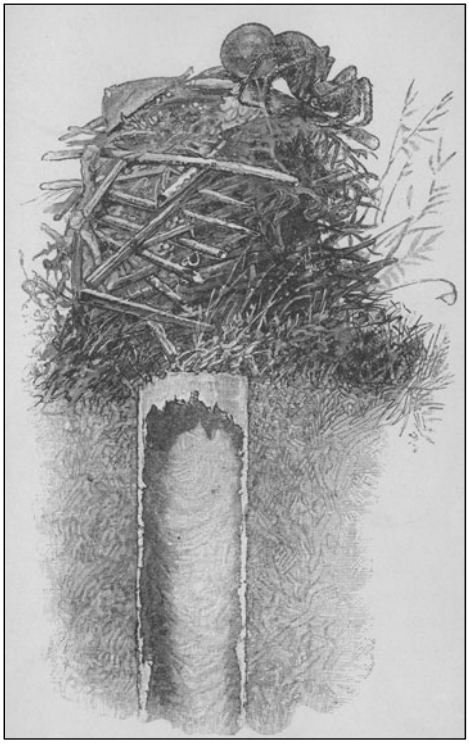


FIGURE 5. Burrow of the *Tarantula turricula*. Treat had the upper nests of spiders sent to her along with the individual insects. In her investigations, she watched to see how the spider secured the "door" of its home to the grass. This is one of the two species of spider that Treat is credited with discovering. A spider is perched at the top edge of the illustration. From Treat, *Home Studies in Nature*, 89.

exclusively" to her studies (*Home Studies*, 15). In another instance, the author reveals that she once became so enthralled in a knotty problem vexing her community of fellow scientists that she "scarcely took note of time, and the small hours of the morning frequently found me absorbed in the work" (*Home Studies*, 141). A brief comparison to Cooper demonstrates the seriousness with which Treat undertook her work. In her Christmas Day entry, Cooper ruminates on the social, familial, meditative, and of course devotional wonders of Christmas for a full six pages (*Rural Hours*, 276–82). In contrast, Treat writes of one Christmas Day, "December 25th I placed tiny bits of raw fresh beef on ten leaves of P. pumila. In six hours the secretion was so copious that the spoon-tipped ends of seven leaves were filled. The secretion had mingled with the juice of the beef and looked bloody, but the meat itself was white and tender. In a little less than twelve hours the fluid had changed color; it now looked clear, and remained so until it was gradually absorbed" (*Home Studies*, 169).

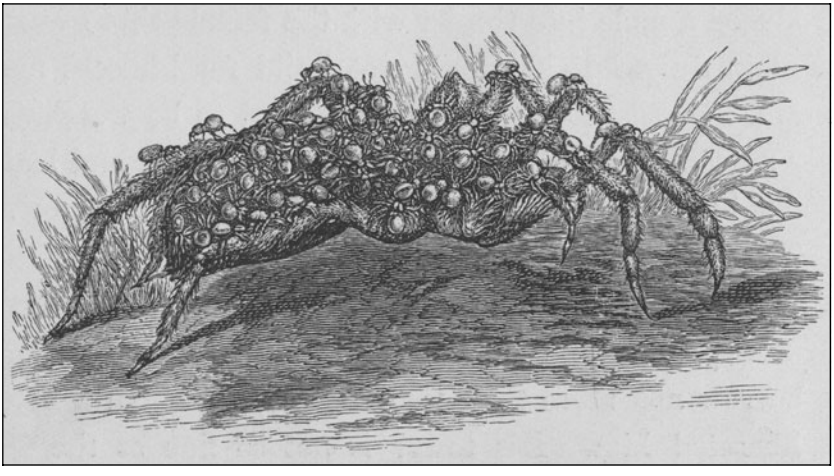


FIGURE 6. Female Spider with Young. Of this spider, Treat writes, "During the past eight weeks I have kept close watch of this curious family, carefully noting the behavior of the mother, who, like 'The old woman that lived in a shoe / had so many children she didn't know what to do.' " From Treat, *Home Studies in Nature*, 94.

In a remarkable article, "Slave-Making Ants," not collected in *Home Studies in Nature* but published by Harper's as *Two Chapters on Ants* (1879), Treat informs her audience that the new information she is presenting on a certain species of ants constitutes "the result of several weeks' close observation, to the exclusion of all other work, commencing from the 1st of July and extending into August."[16] These comments reveal that Treat privileges the observer stance of the dedicated scientist who wants to ask and answer specific questions of nature. She also does not simply believe what she is told but rather trusts her own observations and experiments to tell her about the natural world. In one example, Treat gently holds a "soft, helpless" baby spider in her hands before dispassionately killing it as part of a larger experiment designed to test a popular hypothesis that "young spiders kill one another" (*Home Studies*, 106). Her experiments show that the "naturalists" are wrong: young spiders do not kill each other, but in "the absence of other food the mother crushes some of her own babies, and holds them so that the little cannibals can suck the juices" (*Home Studies*, 107).

If Treat found herself in a difficult position as a woman and a scientist, she does not address this situation in her writings. Instead, she shows

readers how she relentlessly pursues knowledge. Her dedication to science places her outside of what was considered acceptable for women, even in the late nineteenth century, yet she was clearly skilled at her chosen work. One need only recall that Phelps adhered to Linnaeus's outmoded classification system in her textbooks because women, constrained as they were by their domestic duties, would have had little time or opportunity to engage in the intensive study required by advanced science. Treat for her part was well aware of and perhaps quietly bristled at the limits of her position—expert naturalists, she writes in a later essay, could "take a wide range, not being obliged to settle down and stay in one spot" (*Home Studies*, 207). As Rossiter observes, the assumption of the mantle of the scientist particularly disturbed both men and women in this period. While male scientists decried the impending feminization of science as a consequence of women's attempts to break into the professional ranks, women—even those who had fought long and hard for higher education in the sciences—saw these scientific women as defeminized and as a threat to the home.[17]

The point of scientific instruction, according to Phelps, Emma Willard, and others, was to produce an informed, moral, scientific, and self-sacrificing mother. This was, of course, only an ideal, which few of these women, Cooper included, seemed to achieve. Treat was no exception. Her married life apparently started happily, as she and her husband, Dr. Joseph Burrel Treat, achieved a productive working relationship. The two investigated growing fruit trees on their modest property in Vineland and contributed to entomological magazines during the late 1860s notes and articles on the insects that attacked those trees. Joseph, however, apparently grew bored with the limited round of life in Vineland; the couple separated, and he moved to New York City around 1870, leaving Mary to continue her studies in Vineland. The two became increasingly estranged, and Joseph remained in New York until he died in 1879.[18]

Treat's personal reaction to her husband's departure is unknown. If her publishing record is any indication, she may have found consolation for her domestic woes in her scientific investigation, as she published an array of articles in the years immediately following Joseph's departure from Vineland. Conversely, his earlier presence may have hindered her devotion to her studies, and she became free to commit herself to them only after he had gone. Joseph Treat's departure certainly placed Mary in some financial bind, and in this regard Treat may have most felt her position as an amateur,

a part yet still outside of the more profitable world of professional science. Treat, however, was not afraid to remind her wealthier colleagues of the financial cost of her contributions to their herbaria. Writing to Sargent while in Florida conducting research on a rare iris, Treat remarked that the professional botanists had "not the remotest idea of the work, time and money that I have spent on this Iris." Gray and others frequently requested that Treat send samples of the plants on which she worked, but she noted in the same letter that the expense of producing these specimens went unnoticed and unreimbursed: "You have said nothing about the nice waterproof paper (or rather parchment) in which I enclosed the packages, which I think has as much to do in keeping the specimens fresh as the moss! This paper can be procured in only one place in New York at $1.00 per quire. I brought down 5 quires."[19] She also made clear that writing for popular audiences gave her the means of making a living, even if concern for her personal finances meant she occasionally had to make hard choices regarding where to publish. She wrote to Darwin of her plight on May 15, 1876: "Dr. Gray asked me to publish the Sarracenia article in the *American Naturalist*, and you may wonder at my selecting a literary magazine rather then a scientific one, but I am wholly dependent upon my own exertions, and must go where they pay best."[20] By the end of her career, Treat's copious literary output garnered a significant income: she was still receiving royalties from *Home Studies in Nature* just three years before she wrote her last article, a piece for *Forest and Stream*, at age eighty.[21]

In the context of both her scientific and literary work, however, the specific details of Treat's home life are almost unimportant, as she was clearly part of a new generation of educated women who separated traditional domestic roles from the pursuit of scientific investigation. Herrick, a fellow botanist, popular science writer and editor for *Scribner's Monthly*, and onetime correspondent of Darwin, offers another telling example. Herrick had the advantage of being raised in an academic environment, since her father was a professor of mathematics at the University of Mississippi. Furthermore, she received her early education from her aunt, Margaret Coxe, author of *Floral Emblems* and other popular sentimental and biblical flower books. And although Herrick, like Treat, married as a young woman, she found herself the sole supporter of three children after her husband left her to join the perfectionist Oneida community. She too turned to popular science and nature writing to support her family, contributing regularly to

the *Southern Review* and to *Scribner's Monthly* and serving as editor for both magazines. Her most popular pieces, a series of articles that appeared under the title "Hours with the Microscope," drew on research on insects and carnivorous plants. Like Treat, Herrick also republished her most popular articles as best-selling books (*The Wonders of Plant Life under the Microscope* [1883] and *Chapters on Plant Life* [1885]). Her interest in carnivorous plants led her, again like Treat, to contact Darwin to share her observations, and she acknowledges her deep debt to Darwin's scientific research in her published works.[22]

Treat shared with Herrick a desire to be more than just the kind of shrinkingly modest woman that Harshberger described. Treat might have softened the distinction between home and science by expanding the bounds of that home until the domestic round included the spiders, wasps, birds, and ants to which she devoted herself, but she still makes that distinction. Science is science. Rather than using her scientific musings to enhance her domestic space, as Phelps does, Treat utterly subsumes her position as a domestic woman into her identity as a scientist. Although she often couches her criticisms of other scientists in appropriately self-effacing terms, Treat rightfully and repeatedly claims her status as a renowned botanist and entomologist. Treat frequently notes that she writes about plants and insects "that had heretofore escaped the attention of naturalists" and that prominent scientists have recognized her original discoveries (*Home Studies*, 79). Mary Creese notes that Treat was one of only four early women botanists publishing in America before 1880 and that she was the most prolific and well recognized of these women. Treat identified a rare fern (*Schizaea pusilla*) and two new species of burrowing spiders—*Tarantula tigrina* and *Tarantula turricula*—in her backyard laboratory, and Samuel Scudder oversaw her election to the Cambridge Entomological Club of Massachusetts.[23] Gustav Mayr, a Viennese entomologist, named a new harvesting ant species (*Aphaenogaster treatiae*) in recognition of Treat's work on that species, while Swiss naturalist Auguste Forel named the cynipid oak fig root gall (*Belonocnema treatiae*) for her after she found it while on a trip to Florida.[24] Her April and May 1877 letters to Gray and Sargent chronicle her efforts to identify a new amaryllis lily, seen during one of her many treks though the marshes of the St. Johns River near her vacation home in Florida.[25] Gray and Sargent confirmed her discovery, and the Zephyr lily (*Zephyranthes treatiae*) was named in her honor. Darwin

praised her discoveries concerning the *Pingularia*, and she is also credited with rediscovering a rare yellow water lily that had been considered extinct. Treat's letters illustrate her clear pride in preparing elaborate specimen sheets of her discoveries for inclusion in Harvard's herbarium (see figures 7 and 8). Treat's drive to explicate her discoveries rather than merely to record them distinguishes her from a long tradition of American naturalists who self-consciously sought to impress their European counterparts by simply cataloging "discoveries" of the nation's flora and fauna.[26]

Although Treat's published writings show the author crafting a public persona as a conventionally domestic woman, her extensive correspondence with British and American botanists, entomologists, and naturalists demonstrate her conception of herself as a scientist. Treat's personal correspondence consists almost exclusively of letters from prominent botanists and entomologists such as Forel, Mayr, Gray, Walsh, Riley, Sargent, and Sereno Watson. Darwin and Treat wrote a total of fifteen letters to each other between 1871 and 1876. Darwin wrote six letters to Treat during this period, more than he wrote to any other female scientific correspondent. He encouraged Treat's work, asked to see her published and soon-to-be published pieces, acknowledged in *Insectivorous Plants* her superior powers of observation, and discussed with her the reception of his theories in America. More importantly, he asked Treat to supply him with a variety of information and directed her to perform specific experiments on the fly-catching activities of several carnivorous plant species as well as to repeat those she had already done on the relation of the sex of a butterfly to the nutrition of the larvae.[27]

Treat's research on butterfly larvae was among her most controversial work, and the response to her article on the subject illustrates the difficult position in which independent women researchers, working without the benefit of professional guidance and sponsorship, found themselves as they sought a hearing for the results of their investigations. In this case, Treat's simple experiments, detailed in an article first published in *Hearth and Home* in 1871, proved that sex in butterflies was determined (and could be controlled) by the food that the larval insect received: more food and the insect grew to be a female; less food and it grew to be a male. "Controlling Sex in Butterflies" begins in typical Treat fashion, with the author in her home laboratory "feeding a few larvae" for her natural history cabinet. One of the larval insects "wandered from its food, and rested upon

Curtiss, North American Plants, No. 2829
Amaryllis Atamasco, L.
Moist pine barrens, near Jacksonville, Florida.
Legit A. H. Curtiss. March.
Zephyranthes treatiæ Wats.
14 Jan 1962
W. S. Flory & R. O. Flagg, Blandy Experimental Farm
IMAGED
Botanic Garden of Harvard University, 1887
GRAY HERBARIUM
HARVARD
UNIVERSITY
Curtiss, North American Plants, No. 2829
Zephyranthes Treatiæ, Watson.
This was distributed in Fascicle II, but wrongly labeled
Amaryllis Atamasco.
Swamps and low grounds near Jacksonville, Florida.
Legit A. H. Curtiss. Fl. March, fr. Apl.

FIGURE 7. *Zephyranthes treatiae*. Treat sent this carefully prepared herbarium sheet to the Harvard Herbarium in 1887 as a record of her discovery of a rare lily. Courtesy of the Gray Herbarium, Harvard University.

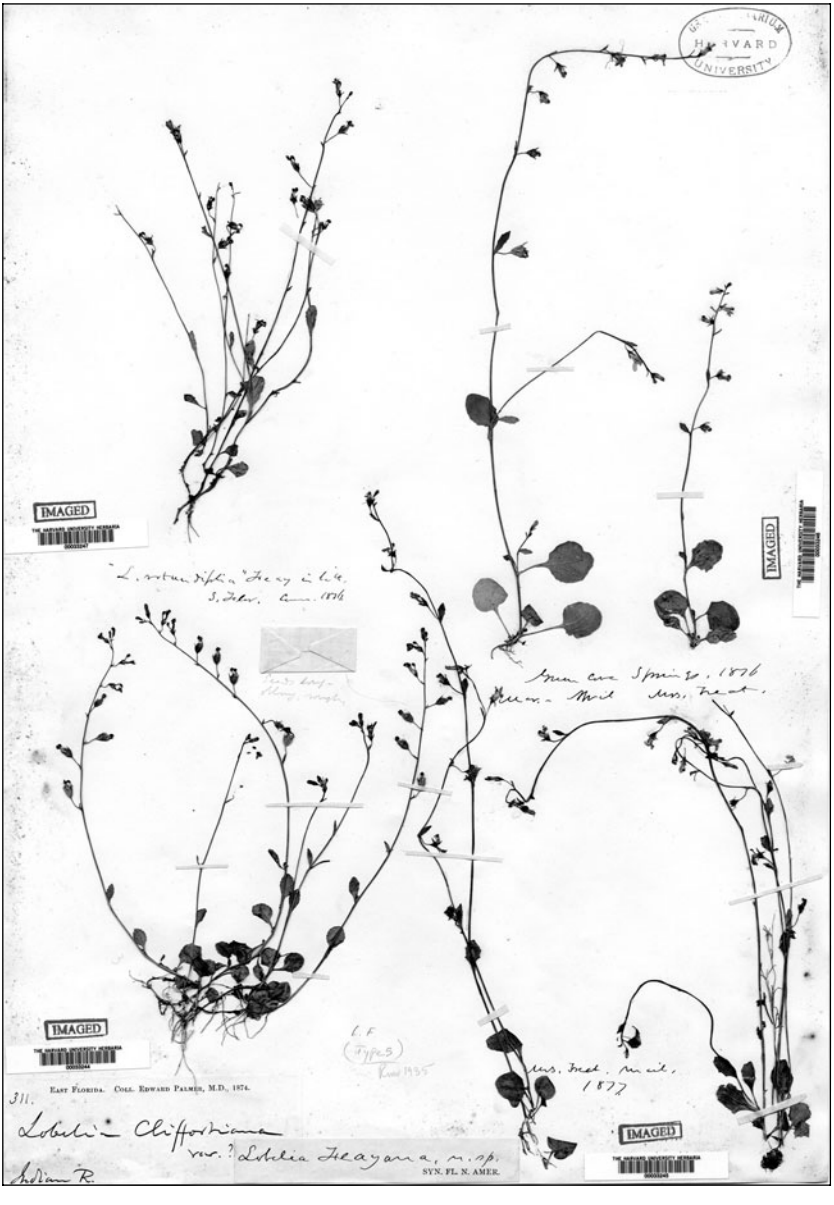



FIGURE 8. *Lobelia feayana.* Botanists often prided themselves on the artistic presentation of specimen sheets. Treat was no exception, and took great care and expense in preparing these type sheets for Asa Gray's collection. Courtesy of the Gray Herbarium, Harvard University.

a book to undergo its transformations." Since a good housekeeper could not have bugs hanging from her books, and a good researcher would not be "inclined to give up the book to this purpose," Treat placed the insect on a stem of fresh caraway, where it began eating again. Soon thereafter, the insect entered its chrysalis phase, later emerging as a female butterfly. The result of this "accident," as she termed it, intrigued and inspired Treat, and in a series of experiments conducted over two years, she alternately fed and withheld food from the larval insects and noted carefully the sex of the emerging butterflies. Her research led her to conclude that "sex is not determined in the egg of insects, and that the female requires more nourishment than the male."[28]

Treat's pathbreaking experiments and results met with both criticism and ridicule from her esteemed colleagues, except Darwin, who chastised her for publishing results that had not been confirmed by experts. Riley's reaction was particularly strident, and he reprimanded Treat in 1871:

> Dear Madam,
>
> I regret that your experiments were not more thorough, for I can hardly see that you have had sufficient grounds for the unqualified statement in the H[earth] & H[ome] article. More error and confusion creeps into our science by these rash and unequivocal conclusions than in any other way. . . . [Y]ou talk of having produced ♀♀ from larvae which *you knew* would have produced ♂♂. This is the most unscientific work of all. By what earthly means were you possessed of such divining powers? . . .
>
> I am too busy now to write more fully; but I fear you will find, in the future, that you have spoken too implicitly on insufficient grounds; and you have no idea how much harm it may do.[29]

Riley, Treat's friend and mentor, concluded his critique on an even more condescending note: "Excuse me for speaking plainly. I want you to be a good and genuine entomologist, and am glad you intend to be more thorough next year." Riley would not live to learn that in 1902, S. L. Shenck of Vienna confirmed Treat's "rash and unequivocal conclusions" regarding the explicit role of larval nutrition in determining the sex of a butterfly. Treat apparently was a much more proficient entomologist than her mentor, despite her promises to act otherwise.

If Treat's "unscientific" work aroused Riley's censure, it also served as

her introduction to Darwin, a decidedly more powerful and influential member of the professional science circuit. In a testament to the author's tenacity; her belief in the accuracy of her method, observations, and results; and her determination to succeed in the world of professional science, Treat wrote to Darwin after receiving Riley's letter and provided a detailed description of the experiments she performed on butterfly larvae. Treat elaborated on the article's narrative of her experiments and described her experimental method. She specified the conditions under which she conducted her experiments, the number of and variations on those experiments, her controls, and finally her results. She also related personal details concerning her health and noted that a "fit of sickness" prevented her from continuing her observations. She concluded the letter with observations from her experiments on a carnivorous plant, *Drosera*, a subject close to Darwin's heart, and noted that these findings would soon be published in Asa Gray's new book, *How Plants Grow*.[30] Darwin, in a tone remarkably different from Riley's condescension, complimented Treat and encouraged her work: "Your observations and experiments on the sexes of butterflies are by far the best, as far as known to me, which have ever been made. They seem to me so important, that I earnestly hope you will repeat them and record the exact number of the larvae which you tempt to continue feeding and deprive of food, and record the sexes of the mature insects. Assuredly you ought then to publish the result in some well-known scientific journal."[31] Treat took Darwin's advice to heart and republished her article three years later in the well-respected *American Naturalist*. After this auspicious introduction, Darwin and Treat continued to correspond, exchanging letters primarily on the feeding mechanisms of carnivorous plants, a topic on which both scientists were working.

Despite her mostly cordial relationships with these leading scientists, Treat openly argues with them in her published works and uses their letters to prove her superior powers of observation. She attacks even the gracious and meticulous Darwin, writing of his faulty observations on the valve of the *Utricularia*, "Even here Mr. Darwin's argument would hardly hold good" (*Home Studies*, 161). She concludes with an excerpt from Darwin's reply to her: "In a letter bearing date June 1, 1875, Mr. Darwin says: 'I have read your article with the greatest interest. It certainly appears from your excellent observations that the valve was sensitive . . . but I cannot understand why I could never, with all my pains, excite any movement.

It is pretty clear I am wrong about the head acting like a wedge' " (*Home Studies*, 162). Darwin also publicly acknowledged Treat's superior powers of observation, writing repeatedly in *Insectivorous Plants* that scientists interested in tracking the movement of these plants should consult Treat and her articles.[32]

Throughout her career, Treat's scientific activities placed her in a difficult position vis-à-vis the home. But despite her domestic troubles, bird and insect constructions of household spaces occupy the central organizational position in *Home Studies in Nature*. The literary marketplace certainly provided Treat with an audience, shared by a small group of women writers, for her depictions of nature's home. But Treat's interest in how animals construct their homes also demonstrates her participation in the larger discussion of the connections between human and nonhuman animals initiated by Darwin in *On the Origin of Species*, *The Descent of Man*, and *The Expression of the Emotions in Man and Animals* (1872). Comprehending Treat's distance from women writing earlier in the century—even those with complex understandings of nature such as Phelps, Fuller, and Cooper—requires an understanding of what *home* meant to Treat.

In *Home Studies in Nature*, Treat repeatedly describes her attempts to "domesticate" animals and insects, to accommodate natural objects to her presence so that they will act as though she were not watching them. The description and illustration of the menagerie, for example, graphically represent how Treat envisioned the task of domesticating animals to her presence. She acknowledges that animals possess an acute awareness of their surroundings, and as she sits in the menagerie, she attempts to merge with the natural creatures around her in an effort to better understand them: "I took a garden-chair, drew my hat pretty well over my face—birds are good observers, and we must manage with care or we shall alarm them—and watched their proceedings" (*Home Studies*, 69).

This move is necessary to make her a "good observer," in Treat's parlance, and to learn the intimate habits of these creatures. She understands the territorial nature of birds and insects but also believes that they can be brought into her expanded household: "Day after day I tried every means in my power to win these birds from their war-like attitude. . . . At last they came to the shrubbery to bathe, and were now fully domesticated" (*Home Studies*, 36). She details another instance of this domesticating process with regard to the tiger spider: "Another individual of this species I

kept several weeks in a similar jar. . . . [S]he became quite tame, and I had the satisfaction to see how she killed her prey" (*Home Studies*, 95). During her study of wasps, Treat resolves "to watch them and see if they could be tamed," and she soon finds that they "allowed me to . . . see them feed their young and go on with their work, building their paper cells" (*Home Studies*, 99). Vera Norwood argues that Treat "domesticates" nature to show the cooperative harmony of objects in nature's household—the stance, for example, that Cooper takes in relation to the robins that nest over her front door. Norwood allies Treat's view of nature with the morally infused one of her "soul-mate," Susan Cooper: "Nature 'red in tooth and claw' receives short shrift in [Treat's] work, whereas images of cooperative behavior predominate."[33]

Treat's view of the natural world, however, puts her work more closely in line with that of Darwin than of Cooper, and Treat's notion of "domesticating nature" means quite a bit more than simple accommodation. Her definitions of both home and nature indicate the deep influence of evolutionary ideas. Natural and sexual selection, struggle, and violence are as much a part of the world that Treat describes as of the one found within the pages of *On the Origin of Species*: wasps kill spiders who do not build sufficiently protective nests, red ants subdue and enslave black ants, humans equally abuse all creatures.[34] Gillian Beer succinctly defines the action of natural selection: "The fitness of an individual organism to its environment increases the chances of survival of individuals with specific characteristics and of those of their descendants who inherit these characteristics."[35]

In *Descent of Man*, Darwin defines sexual selection, the primary driver in natural selection, as "the advantage which certain individuals have over others of the same sex and species solely in respect of reproduction." These advantages, which include "weapons of offence and the means of defence . . . for fighting with and driving away their rivals" and "various ornaments . . . serving only to allure or excite the female," make males the active players in the reproductive drama.[36] Darwin's explanation of sexual selection in particular drives Treat's rendering of the appearance and behavior of animals in nature, as in her description of the "elegant scarlet tanager" with his "more soberly attired mate" (*Home Studies*, 17) or of the "fierce battles" that take place in the spring among cardinal grosbeaks who have been peaceful neighbors all winter. The "daring conqueror" of the scene, as the doctrine of sexual selection would predict, presents a "striking appearance:

a conspicuous crest ornaments his head, his plumage is elegant, with a rich vermillion hue, and he is a fine musical performer." The conclusion of the scene both fulfills the evolutionary drama and satisfies the domestic directive of the day: the "hero" stands alone, "the proud possessor of a quiet, soberly attired mate" (*Home Studies*, 47, 46). Interestingly, Treat relies on "Darwin's plot of the modest female being grasped or possessed by the passionate male," as Burt Bender describes sexual selection, precisely because it confirms gender hierarchies and thus does not threaten the social models that Treat upholds.[37] Treat agrees that in the human world as in the nonhuman, "woman would quietly take her place by the side of her brother, with no contentions for rights."[38]

Yet even though Darwin portrayed life in the natural world as a series of struggles for reproductive success, models of cooperation form a hallmark of his later works on interspecies relationships (i.e., his descriptions of domestic animals such as dogs and cats). In these later writings, Darwin examines communities of beings with equal status, if different abilities, a definition of community that Treat takes to heart in her studies. She extends the concept of home to make it quite expansive—bird homes equal human homes not because a divine creator has given them to humans as exemplars but because they are fundamentally the same. Instead of remaining apart from "nature's homes," human homes become one part of a web of communities. Although Treat shares in the cooperative spirit that marks Cooper's writing, nature in the post-Darwinian scheme has an order quite distinct from the moral one that holds together Cooper and Phelps's world: natural and sexual selection, adaptation, and chance (the apparatus of evolution), not special creation, stasis, and divine order (the mechanisms of natural theology), become the tools by which nature is maintained.

The differences between these two worldviews are significant. A moral scheme rooted in natural theology makes the natural world understandable only in terms of a relational model: nature exists as a model for human behavior and reveals to humans the moral obligations that accompany their position at the top of creation. Human action, even if deemed wicked, is justified because nonhumans are lower in the natural order than humans and have been given to humans for them to dominate as part of God's plan. In Treat's world, humans possess no such rights. A moral scheme rooted in evolutionary terms not only levels the playing field by placing humans and nonhumans on equal footing in the mechanisms of the natu-

ral world but also places an increased emphasis on humans and nonhumans as parts of and participants in distinct yet interrelated communities. Darwinian evolution did not, as was commonly argued, displace morality: as Darwin argues, "virtuous tendencies" can also be "strongly inherited" (*Descent*, 127). Nor did Darwinism turn nature back into a machine, this time a godless one that left humans "morally naked to the world," as Robert Richards explains. Instead, Darwin "articulated nature so as to display its moral spine."[39]

In *The Descent of Man*, Darwin argues that evolutionary principles replace a morality based on "Selfishness" and the instinct for self-preservation with a morality that "comes into existence only with the social instincts," according to James Rachels.[40] The "moral qualities," as Darwin terms them, develop gradually, beginning as "habits" that tend to preserve the community, such as performing "benevolent actions" or nurturing the young (*Descent*, 135). Such habits, preserved over the course of generations, eventually become instinctual; thus, moral knowledge, writes Richards, is "really an instinct acquired by our ancestors" that "prove[s] necessary for social cohesion and development."[41] Darwin explains further the development of the moral sense and the good of the community when he writes that the "moral sense" and the "social instincts" have

> certainly been developed for the general good of the community. The term, general good, may be defined as the means by which the greatest possible number of individuals can be reared in full vigor and health, with all their faculties perfect, under the conditions to which they are exposed. As the *social instincts both of man and the lower animals have no doubt been developed by the same steps*, it would be advisable . . . to use the same definition in both cases, and to take as the test of morality, the general good or welfare of the community. (*Descent*, 124–25; emphasis added)

Darwinian morality, then, constitutes a shared characteristic since it originates from the social instinct, which is also shared. Nor does Darwin see morality necessarily as a singular characteristic of humans: "Any animal whatever, endowed with well-marked social instincts [as birds are], the parental and filial affections being here included, would inevitably acquire a moral sense or conscience, as soon as its intellectual powers had become as well, or nearly as well developed, as in man" (*Descent*, 101).

Evolution was not antithetical to moral principles, as Asa Gray argued

in his influential review of *On the Origin of Species*, and according to Peter Bowler, evolution was accepted in some circles "because it could be accommodated into a world view that implied that the development of Nature has a moral purpose."[42] The birds that share Treat's grounds become her community, her society, and she must acknowledge the responsibilities attendant on this reciprocal relationship. Humans cannot separate themselves from the "general good" of a larger community, of a society that was becoming defined in the late nineteenth century as "a rule-bound entity that was greater than the sum of its individual parts."[43] The idea of the home, a place "common to all," functions in Treat's book as that which makes it possible to "forg[e] bonds across social distances" and to extend the bounds of society to include the nonhuman (as Darwin demanded).[44]

Treat tackles these difficult questions of responsibility, extended community, and hierarchy in nature in a striking passage on the repeated effects of violence on nesting robins. Here, Treat unsuccessfully tries to study a pair of robins who are "new-comers" to her yard. She notes that unless disturbed, robins always build their new nests close to those built the year before. Because these birds have not done so, she concludes that "these strangers had undoubtedly been badly used by some member of the genus *homo*, who had broken up and destroyed their home, making them hate and distrust all mankind" (*Home Studies*, 33). Because human communities operate according to laws, so must the extended community, and Treat argues that there "ought to be a rigid law enforced to protect our songsters against such vandals" (*Home Studies*, 34). Although many other women writers (Cooper, Mabel Osgood Wright, Florence Merriam, and Olive Thorne Miller, among others) argued for legal protection for birds, Treat claims such protection based on a bird's equal standing as a rational creature.[45]

Wright argued in *Citizen Bird: Scenes from Bird-Life in Plain English for Beginners* (1897) that birds could claim rights as citizens of the extended nation. Treat also appeals to civil rather than moral law in her defense of birds. In "Our Winter Birds," she writes of cannibalism, "At the sight of this apparent cruelty in nature comes the impulse to shoot these raptorial birds. But when we think of that other biped whom it is not lawful to shoot, who often hunts and kills the beautiful denizens of fields and woodlands from mere wantonness and sport of the chase, the hawk or owl, which takes a bird only to appease his hunger, towers above him in moral

rectitude. So our gun leans idly against the wall" (67). As Norwood notes, "The explosion in theory attendant upon the publication of Darwin's *On the Origin of Species*" enables Treat to argue "against human supremacy in a hierarchical natural world created in one stroke by God."[46] This profound shift marks the distance between mid- and late-nineteenth-century perspectives, represented in this analysis by Cooper and Treat, respectively. As a member of the human race, Treat assumes responsibility for the actions of "that other biped" who wantonly shoots game animals, vowing that she will not participate in what she regards as a slaughter of innocents.

Cooper, who operated under the hierarchical model that Norwood describes, read no such complicity in her actions despite her keen awareness of species decimation. Thus, in a telling passage in the 1850 edition of *Rural Hours*, Cooper opens an entry, "A fine bunch of woodcock, with several partridges, and a brace of wood-ducks, brought to the house." The number of birds killed must have affected Cooper at some level because she immediately follows her description of the birds with the remark, "But all our game-birds are rapidly diminishing in numbers." Later in the passage, she laments, "In this country very little attention has been paid to this subject, and probably everything of the kind will soon disappear from our woods. The reckless extermination of the game in the United States would seem, indeed, without a precedent in the history of the world. Probably the buffaloes will be entirely swept from the prairies, once covered with their herds, by this generation." Failing to acknowledge that she participates actively in this rapacious culture, Cooper complacently concludes her meditation on the fate of wood ducks by noting, "We had one for dinner; it was very delicate" (*Rural Hours*, 190). Interestingly, in the 1887 edition of *Rural Hours*, Cooper deleted all mention of the game extermination, ironically doing so precisely when the giant buffalo herds of the West had been reduced to just a few hundred animals. Despite her laments for the destruction of animal species, Cooper could not free herself from a teleological model that read plants and animals as objects of human use and enjoyment.

Freed from such teleology, Treat can revise the basis for the argument for protection from an animal's moral uses to its equal standing as a rational creature. For Treat, birds display in the "quality of their intellectual operations . . . no manifest difference from the reasoning of human beings."[47] The hierarchy of nature is not fixed but fluid, and supremacy constitutes a matter not of absolute and immutable fact but of circumstance and per-

spective. Treat uses the example of the nesting robins "to show man his proper place," happily agreeing with her cited sources, which argue that humans "are not in all respects the head of animal creation" (*Home Studies*, 35, 34). Indeed, if birds "were to discuss their own zoological position," Treat writes, "they might show abundant reason why they were at the head of creation, allowing them to use the degree of perfection of special organs . . . as token of rank" (*Home Studies*, 34).[48] To defend her position, she excerpts a passage from Karl von Baer, a prominent nineteenth-century embryologist and a key source for Darwin:

> In some points, other creatures are further developed, more highly organized than ourselves, and we carry about in our bodies, as permanent structures, things which are but temporary and embryonic with them. In birds, whose great organic specialty is flight, at a certain stage of life within the egg the lungs are free in the chest and the bones are full of marrow, as ours are all our lives long. It is not till afterwards that the lungs become tied down to the back of the chest, that air-sacs communicating with them spread over various parts of the body, and the bones become hollow and thin. . . . In the same way it cannot be denied that feathers are more complex, and therefore higher developments of the structures we call hair. (*Home Studies*, 34)

Birds are perfectly adapted for their tasks; in terms of the ability to fly, bird structure supersedes that of humans. Treat appeals to Darwin and his sources to show that "the difference in mind between man and the higher animals, great as it is, is certainly one of degree and not of kind" (*Descent*, 130). All animals have special abilities, all animals adapt to their special conditions, and the most successful animals (the "fittest") turn circumstances to their advantage (*Descent*, 135).

Darwin's theory emphasizes a dynamic interaction between an organism and its environment, which Beer defines as "a matrix of possibilities, the outcome of multiple interactions between organisms and within matter."[49] Successful individuals develop and pass on the characteristics needed to deal with life in an uncertain, chance-driven world. Animals in Treat's fluid world lack the fixed habits assigned to them by natural theology and instead adapt to their environments. Viewed in this light, morality takes on a remarkably different meaning, and Treat uses her discussions of rea-

son and adaptation to challenge inherited notions of morality based on the notion of the fixity and infallible design of the natural world. Treat embeds a complex discussion of chance and adaptation into a seemingly conventional essay on the nesting patterns of common birds in the opening chapter of *Home Studies in Nature*: "Let me ask those who deny to animals any faculty except instinct what it is that induces birds to vary from their usual mode of procedure. They sometimes leave their habitat in the woods for our lawns and gardens, and, as opportunity offers, choose new materials and new methods for the construction of their nests" (*Home Studies*, 74). In one instance, Treat gives "opportunity" a hand and supplies her New Jersey birds with some Florida moss, which she hypothesizes they will find useful: "Several pairs of orioles soon found this good building material, and used it in the construction of their nests" (*Home Studies*, 18–19).[50]

Alone, this description of bird habits is not particularly striking—some birds employed the material in their nest building, while others were "determined to preserve the established customs of their ancestors" and "seemed to look with distrust and suspicion upon all the feathered builders who were so quick to take up with anything new" (*Home Studies*, 20). But the passage takes on new meaning in the context of Treat's investigations into instinct, adaptation, and the role of reason in an animal's life. Applying the principles Darwin establishes in *Descent*, Treat's birds represent what Darwin terms a society in its "rudest state," where the wisest individuals make innovations on established techniques, and those innovations, if successful, are then imitated by the rest of the group. Imitation of this sort constitutes a kind of education, and he adds that the "habitual practice of each new art must likewise in some slight degree strengthen the intellect" (*Descent*, 132, 133). In her most detailed essays on birds' nest-building habits, "Do Birds Improve as Architects?" from *Home Studies* and "Notes on the Intelligence of Birds," published in *Lippincott's*, Treat borrows Darwin's language from *The Descent of Man* as she directly confronts the contested question of whether animals possess reason. "If birds were allowed to discuss their own merits as architects," she claims in "Do Birds Improve as Architects?" "they might bring forward abundant proof to show that they do improve in building." Moreover, she continues, "they also might lay fair claim to the possession of reason" (*Home Studies*, 68). Treat reiterates this point later in the chapter, adding that mere "instinct" cannot account for all animal

behavior: "A close observer of birds cannot fail to see that they exercise reason and forethought, not only in the management of their young, but in many other things" (*Home Studies*, 74).

This idea that animals and insects are thinking, reasoning beings has significant consequences for how Treat views her world and for the picture of that world that she presents to readers. Why argue that animals have reason? Again, the "home" in *Home Studies in Nature* represents more than initially appears to be the case. Treat always couches her discussions of reason in the context of animals and insects building homes. In the "Ground Spiders" chapter, for example, Treat begins by asking, "Do insects really possess mind? If not, what is it that often impels them to behave precisely as reasoning beings?" She then provides a brief passage from a work by a French scientist who performed a series of observations on the mechanisms of an insect's nervous system that confirmed a nascent similarity to human "cerebral hemispheres" (*Home Studies*, 103).

Since the terms of science may distance readers from the subject, Treat immediately returns to more conventional language. She draws readers into the debate by using terms to which they can relate: "If any one will closely observe the behavior of insects—especially ants, wasps, or spiders—he will not be at all startled or surprised with the announcement that these humble creatures have brains like our own." Observation here is a matter of choice. The answers are available to anyone who is interested. The noticeable behavior that signals the similarity is that of home building: "Many spiders build for themselves homes—not merely nests to rear the young . . . but homes to which they become strongly attached" (*Home Studies*, 103).

This statement does not seem particularly striking: after all, the home in nature has long been seen as the proper object of study for women. Treat appears merely to continue the tradition, except that in her model, humans have responsibilities toward the natural world not because of supremacy but because of communality. Here, readers feel the weight of the word *studies* as well. Treat's nature watches back—birds "eyed" her as closely as she "watched" them (*Home Studies*, 72). Reciprocity of this sort does not exist in a world where nature exists solely as a model for human behavior, as in Cooper's view. But Treat's discussion of home is truly remarkable precisely because of the prominence of reason—not morality—in holding together the home. Treat reverses the model: humans exhibit reason through their ability to construct homes. Similarly, birds, insects, and other creatures

create homes that resemble human homes; therefore, creatures other than humans must possess reason. Treat argues that the best homes (human or nonhuman) are the simple ones that best protect inhabitants from enemies and other dangers.[51] In depicting the construction of nonhuman homes, Treat questions the supposed substantive difference between human and nonhuman, and she uses nest construction to show kinship through reason. As Darwin describes the process of innovation as occurring at the "rudest stage" of society, Treat similarly uses "Do Birds Improve as Architects?" to liken the progress of birds learning to build nests to the movement from savage to civilized societies.

By using the home, Treat engages, albeit indirectly, with discussions of the status of the woman in the home as observer of the natural world. And although Treat never mentions her own training or seems concerned with making a statement about women's education in the sciences, she implies that women possess the necessary characteristics to become "good observers"—access to a limited field of study (i.e., the yard) and the ability to reason. If reason rather than sentiment or even morality governs the construction and composition of the home, women, who as natural beings share this conception of home, are necessarily rational. And even if Treat's descriptions of female birds and insects adhere to traditional gender codes, she still grants women an observer position based solely on their ability to reason, not on their heightened affinity as moral beings. Accordingly, Treat's new model profoundly reenvisions the domestic woman as nature observer.

The limited range of the "home" becomes a boon in Treat's model. Like the birds who adapt to new materials, women should adapt to changing social conditions and turn their homes into laboratories. Any woman with a yard, the absence of other distractions, and, of course, the means can build an insect menagerie. To disprove the claims of "naturalists," such a woman merely must look carefully at the ground under her feet. Good observing means close observing, which is not possible when a person takes a "wide range," as do professional (male) naturalists. At the same time, Treat understands that for her individual observations to make sense, they must be inserted into a larger sphere of inquiry. Just as Treat sends her discoveries out into the public space, she encourages other women to observe and then to participate in conversation about those observations. She repeatedly notes that several of the women in her neighborhood are "good

observers" who often share what they see with her. Treat's approach here prefigures that of a woman scientist such as Rachel Carson, who relied on the reports of amateur bird watchers (mostly homemakers) to support her claims regarding the dangers of DDT.

Treat participated in several concurrent conversations about the status of perception and the position of the observer in the late nineteenth century. Scientists and writers alike responded to the call for more realistic representations of the natural world, and it was no accident that the cluster of magazines that published Treat's portraits of the habits and lives of insects and flesh-eating plants was the same group in which "realism" arose as a literary impulse. Treat participated in the realist project, which sought to bring "to literature the same concern for the mapping of society and its behavioral rules and the same methods of observing the concrete rather than replicating the abstract" that characterized research in new social science disciplines such as sociology.[52] A brief survey of the *Harper's* and *Atlantic Monthly* issues in which Treat published confirms her status among similarly minded writers and scientists. Treat's articles appear alongside pieces describing natural science, natural selection, and the "The Exact Progress of the Sciences" as well as fish, rats, dairy processes, glaciers, snowstorms, hurricanes, dwellings in the South, Irish fishing villages, and modern bee culture.

Treat fulfilled the realist mandate to bring to her work what Nancy Glazener calls a "professional disinterestedness and mastery" that "required the author not to bring any interpretative system to bear on the reality that was supposedly 'observed' and 'rendered.' "[53] As Immanuel Kant argues, "Reason, in order to be taught by nature, must approach nature . . . not like a pupil, who has recited to him whatever the teacher wants to say, but like an appointed judge who compels witnesses to answer the questions he puts to them."[54] Such a posture meshes with Daniel Borus's description of the intellectual movements that informed the realist posture in literature in late-nineteenth-century America, where "intellectual life must rest on the compilation of facts about the external world from which the trained mind could formulate laws."[55] Observation, under this paradigm, does not ratify laws already in place but rather provides evidence for the formulation of new laws, a mode of scientific investigation dramatically different from that employed earlier in the century.

This model assumes the observer's subjective position: the observer acts as Kant's judge, asking those questions he or she thinks "fit to propose." Mechanistic models of nature operate in terms of absolutes: a bird's habits, for example, remain fixed regardless of whether anyone is watching. An ecological view of the natural world—an understanding of nature as a web of interrelated parts—recognizes the impossibility of absolutes and underscores the notion of reciprocity: the birds in *Home Studies in Nature* watch Treat as she watches them. Does Treat acknowledge that this changed behavior in both birds and insects will affect the "truth" of her observations about them? Perhaps. She admits that a bird's awareness of her presence changes its habits, as in the discussion of victimized robins, and she notes that she must act "gently" to gain the trust of natural creatures. But Treat does believe that a "good" and "close" observer can incorporate herself into the natural world to the extent that such impact on habit will be minimal. Indeed, cohabitation is the norm, not the exception, so the observer who works in concert with nature actually "sees" things as they really are.

The scientific discussions of ants and insectivorous plants in *Home Studies in Nature* best map the interplay between objectivity and subjectivity in Treat's scientific investigations. Treat begins by explicitly arguing that the process of good observation requires a sometimes uncomfortably close interaction with the creatures under observation. For example, while observing ants, Treat becomes "very much interested" in experiencing the strength of an ant's bite, and she allows one angry individual the opportunity to bite her hand, discovering as a result that "it could hurt considerably, and that it left a small purple spot where its mandibles had pierced."[56] Like other professional observers, however, Treat does not impose a moral system on the objects she studies, nor does she believe that she has a moral obligation not to kill or otherwise imperil the objects she investigates. Such a position constitutes another indicator of the distance between women studying science post-Darwin and those before. Earlier in the century, Phelps and others had argued that the requirement to kill specimens made studies of living beings unfit subjects for women, with Phelps claiming, for instance, that animals "cannot be dissected without painful emotions" (*Familiar Lectures*, 15). By the 1860s, however, women who ventured into these fields, like entomologist Charlotte Taylor, made little apology for their necessary actions. As Taylor writes in "Spiders—Their Structure and Habits,"

> It is an impossibility to dissect a spider thoroughly, and the complications of the body are far from being understood even at this day. [An illustration shows] a mould taken by dropping melted suet into the abdomen of a *Lycosa*, even while it was palpitating with life. Do you wish a receipt for this cruel operation? You must excuse me; matters look always so infinitely more disagreeable repeated by the pen. We will make an apotheosis of fifteen martyrs to science, and I am grieved that I can offer no more positive results for such cruelty.[57]

Taylor willingly concedes that the spiders under experimentation are "martyrs" to science, but she also reminds her readers that vivisection constitutes a necessary if "disagreeable" aspect of research. She notes, however, that this aspect is more likely to disturb those at a distance from it, like the visitors to Treat's home study. But as Treat's writings show, women who studied living beings were not hardened to suffering, as Phelps feared would be the case. A significant difference exists, for example, between Treat's understanding of cruelty and unjustified violence toward nonhumans and her views on rational scientific investigation: she decries random or excessive acts of violence, such as that done to the robins, but realizes the necessity of sacrificing an individual (or an individual's home) for study.

Taylor's example also demonstrates the shift in perspective of women writing about nature and science in the late nineteenth century. The writer/scientist, not the object under investigation, necessarily sits at the center of any experiment she performs. While a reader is hard pressed to distinguish Fuller's "eye" from her "I" and Cooper's "I" can hardly be found at all, Treat forcefully inserts her "I" into the picture. In her account of her studies on the *Utricularia clandestina*, the investigation for which Darwin praised her, Treat writes, "I devoted my time for several days . . ."; "I worked . . ."; "I repeatedly took . . ."; "I entrapped . . ."; "I would find . . ."; "I now directed . . ." (*Home Studies*, 141–43). At the end of this section, she asserts both her professional stance and the set of questions she needs answered: "If I could only prove that the contents of the utricles were carried directly into the circulation my point was gained. This was now my sole work for several days—to investigate this subject closely" (*Home Studies*, 145). However, at the same time that Treat establishes her presence in her observations, she remains wary of overreliance on sensory experience and repeatedly stresses the real limits of experiential knowledge in scientific investigations.

Treat uses her studies of the digestive mechanisms of the insectivorous plants *Drosera*, *Utricularia clandestina*, *Dionaea*, and *Sarracenia variolaris* in part to explore these contradictions. She finds that sensory experience is important in uncovering the mechanisms of nature, but the impossibility of replicating an individual's sensory experience means that it cannot be the only means by which a "point was gained." Again, Treat responds to the change in her culture's understanding of the word *observation*, which, as Jeremy Campbell compellingly argues, "has quite a different significance from earlier usage." In the latter part of the century, "something 'happens' only when that something is registered, whether by a mark on a photographic plate, a pointer reading, a track in a cloud chamber, or some other device."[58] In a remarkable instance, Treat volunteers her finger for duty as such a recording device, inserting it into the trap of the carnivorous *Dionaea*. Treat informs readers of her purpose, her plan, and her results: "That I might more fully test the strength and power of the plant, I one day placed the tip of my little finger in a trap, resolving to become a self-made prisoner for five hours at least." She settles into her experiment but finds that she cannot keep her resolve: "In less then fifteen minutes I was surprised at the amount of pressure about my finger, and for more than an hour the pressure seemed slightly to increase" until "my arm began to pain me" (*Home Studies*, 186–87).

Treat discovers that her finger constitutes an inadequate recording device. In this instance, she acknowledges the pernicious effects of subjectivity in experiential learning and states that she has discovered "a problem for the psychologist." She has already witnessed a "putrid" mass of undigested insects in this plant and suggests that this knowledge must affect the entirely subjective experiment she performs: "Was it the knowledge of my being held fast that caused the pain?" Treat, disappointed by the results of her "experiment," writes, "In less than two hours I was obliged to take my finger from the plant, defeated in so simple an experiment, and heartily ashamed that I could not better control my nerves" (*Home Studies*, 187). This experience provides Treat with some valuable information—she decides to taste the "slimy secretion [that] had commenced oozing slightly from the inner surface of the trap" and finds that it "excited the salivary glands to a wonderful extent, which continued for hours" and that its "sweet taste was succeeded by a disagreeable acrid feeling" (*Home Studies*, 187, 192). Ultimately, however, she relies only on the "sum" of a variety

of "recorded experiments" to prove her hypotheses about the plant and its secretions.

Treat is aware that her "observations and experiments" alone are not enough to comprehend a plant in its entirety. The botanist can identify and classify but needs help from the chemist, the entomologist, and an army of other specialists to understand all aspects of a plant. Treat argues for such cooperation throughout her groundbreaking examinations of insectivorous plants. In one experiment, Treat notes that after drinking the secretion of the *Sarracenia variolaris*, flies "became stupid . . . they were unsteady on their feet, and seemed to be intoxicated" (*Home Studies*, 191). When Treat shared the results of her experiments with Gray, he tried to dissuade her from publishing them, saying simply, "You know none of the botanists agree with you." Treat replied with candor and authority: "I cannot help it. It must go in for I have seen it for myself, and I know it is so."[59] Repeated experimentation may disprove her claims, but she has seen what she has seen and needs to make public those observations.

As Gray predicted, her descriptions came under fire, and Treat notes that an "eminent scientist" challenged her to "prove" a suggestion about the intoxicating effects of the *Sarracenia*'s secretions. In a rather haughty reply, Treat flatly states the impossibility of her discovering the answer to this problem: "I do not see how I can prove it. I am not a chemist, and cannot analyze the secretion. I can only give the result of my observations and experiments." Treat will happily supply the chemist with whatever observations she can, and in this case, she almost volunteers her whole body for the experiment: "I might get a large quantity of the leaves and make a decoction of the secretion and drink it; but I find the flies never recover from their intoxication, and my fate might be the same if I took a sufficient quantity" (*Home Studies*, 192).

Although Treat was an accomplished entomologist, her original investigations into the digestive mechanisms of insectivorous plants both put her on the scientific map and were among some of her most popular and highly regarded articles. The general reading public was fascinated by these accounts of animal-eating plants; Darwin's 1875 publication of *Insectivorous Plants* no doubt accounted for the spike in interest in the mid-1870s. Darwin's plant studies comprised a key component of his great synthesis of the natural world. Hunter Dupree explains this synthesis in his introduction to Gray's *Darwiniana*: "The plants which behaved like animals and showed

in their sensitivity the rudiments of a nervous system were demonstrating all the while to Gray the most fundamental of Darwinian generalizations. The whole organic world, plant and animal, is akin."[60] Treat apparently came to the study of these plants long before Darwin popularized it, mentioning the "*Drocra filiformis*" as early in 1866 in her "Botany for Invalids" series.[61] Writing to Darwin, Gray noted that Treat had taken up her study of *Utricularia* "out of her own head," while she told Gray that her "ardor is somewhat dampened to know that Mr. Darwin is ahead" in his studies of the plants.[62]

Treat's discussions of insectivorous plants constitute the most scientifically challenging and adventurous sections of *Home Studies in Nature*. Any view of the domestic space is lost under the focus of the microscope, as Treat stakes out her ground as a professional scientist and writer. The "dewey" freshness of plants that Phelps claimed would fit a woman for her domestic duties has become the "putrid mass" that takes the woman away from that space. Treat must have appreciated the irony of this overturning of conventional notions of the flower: she makes a remarkable return to the sentimental flower poetry tradition near the end of her book. In "*Sarracenia variolaris*," Treat reminds her readers not of the devotional flower poems of Sara Josepha Hale or Margaret Coxe but of the erotic flower poetry of Erasmus Darwin, Charles's also-controversial grandfather. Treat borrows from the elder Darwin's poem but imagines the lines coming not from the poet but from the plants themselves, whom she has "furnished with tongues" (*Home Studies*, 203). The plants recite almost verbatim the lines from *Loves of the Plants*:

> Rest, silver butterflies, your quivering wings;
> Alight, ye beetles, from your airy rings;
> Ye painted Moths, your gold-eyed plumage furl,
> Bow your wide horns, your spiral trunks uncurl. (*Home Studies*, 203)

But where Darwin ends his verse in a world of erotic possibility, writing, "Glitter, ye Glow-worms, on your mossy beds," Treat's carnivorous plants end their poem on a note of chance and violence: "Glitter ye Glow-worms, on our clasping beds" (*Home Studies*, 203).[63] The "mossy beds" of Darwin's poem have become the "clasping beds" of Treat's scientific investigations. She cites Darwin, but rather than relying on his outmoded portrait of the relationships between objects in the natural world, Treat rewrites the poem

and provides a new ending based on her observation of the actions of these plants. She writes at the end of her essay, "On observing these carnivorous plants it is easy to imagine them avengers upon their destroyers, and the metamorphoses of the ancients accomplished, by which living animals are transformed into trees and flowers. The 'Loves of the Plants,' as pictured by the elder Darwin, are shown by his grandson and other naturalists to have been transmuted into the love of sentient life" (*Home Studies*, 202–3).

The phrase "sentient life" would have echoed with Treat's readers, who by this point in the book would have been aware that the world around them was filled with reasoning beings that share humans' instincts and that will eventually share in their moral traits. Readers would have recalled from Treat's discussions of home building that the insects so greedily ingested by carnivorous plants were reasoning beings, intent on building and maintaining communities. But the world these sentient beings inhabited was dangerous, violent—nature "red in tooth and claw." As wasps lay in wait for unsuspecting ground spiders to open the doors to their nests, so beautiful plants, with pleasing odors and intoxicating tastes, quietly lured silver butterflies to rest their quivering wings on "clasping beds."

Treat's careful, ordered investigations into nature taught her that the natural world is not a designed space held together by divine order. Spiders, wasps, and even birds engage in fierce territorial battles. The world is a dangerous place that is not always kind to the individual. Chance lured an insect to a carnivorous plant: those lucky species slowly developed mechanisms to avoid the trap of the plant, while those without such luck were turned into a "putrid" "filthy mass" that the observer could always only partly understand (*Home Studies*, 202). But the continual warfare present in the natural world does not hinder these creatures from living their lives, pairing with their mates, and raising their families, as Treat learned from Darwin's evolutionary narrative and saw confirmed in her observations of nature. Violence and struggle will always be part of the drama of survival, but so too will community building, benevolence, and the instinct for right action.

EPILOGUE

# Human Homes in Nature's Household

## *The Emergence of a Conservation Ethic*

SUSAN FENIMORE COOPER enjoyed success with *Rural Hours*, as evidenced by the nine editions of the text published between 1850 and 1868. But after the ninth edition, the author substantially emended the book for publication in 1887. This edition looked very little like the *Rural Hours* of 1850, as Cooper cut more than 40 percent of the original text. By the end of the century, much of what had made her seasonal journal compelling and engaging had landed on the cutting room floor, including many of the long devotional passages and almost all of the passages of biblical exegesis, among them the sustained meditation on Psalm 137 discussed in chapter 3. Cooper excised her complaints against flower language books, the accounts of domestic labor and rural manufacture, most landscape descriptions that evoked the picturesque aesthetic, and virtually all of the scientific discussions of bird and plant habit and habitat.[1] What remained was a text that lacked the density and complexity of the original and that presented late-century readers with an uncomplicated and often simply nostalgic portrait of simple country rambles.

While Cooper was simplifying her text, other women were taking the opposite path, following Mary Treat's lead away from sentimental or religious ties to nature and toward connections bound by rigorous scientific discipline. By late in the century, women scientists could be found in most fields of study, even if they were often restricted to subordinate positions. They published in recognized scholarly journals and taught at prestigious universities.[2] As Katherine Dooris Sharp notes in her 1913 description of "The Woman Botanist," the select few who overcame the "obstacles" of scientific study and bore the "cold reception" of professional male peers often did so at the expense of satisfying home lives. Many remained single or

childless, "an M.Sc. or Ph.D. . . . who calmly work[ed] in the laboratory, unharassed by household cares or maternal duty."[3] Yet while professional women were becoming visible in the sciences, their amateur counterparts were becoming increasingly unable to produce the kinds of expansive investigations into the phenomena and languages of nature written by Almira Phelps, Margaret Fuller, and Susan Fenimore Cooper. In particular, the understanding of what it meant to be a "good observer" of external nature changed dramatically by the end of the century as scientific investigations, increasingly organized under ever-narrowing disciplines, were largely performed in the laboratory rather than in the field.

Specialization, professionalization, and Darwinism profoundly affected the perception of nature by the 1880s. To the casual observer, the split between science and sentiment appeared complete, as scientists, social theorists, and writers alike embraced the view of nature as a relentless struggle for existence. Women writers must also have felt the pressures of the ruptures caused by Darwinism. They, like the women botanists who had to choose between the home and the laboratory, *seemed* to have two mutually exclusive options available for describing nature: either moral emblem or scientific laboratory. A quick survey of popular fiction and nonfiction titles dealing with nature appears to bear out this assessment. On the one hand, writers such as Rose Porter and Louisa May Alcott produced volumes of flower and nature fables for juvenile audiences that often simply reworked the tired formulas of sentimental flower books but dispensed with the cumbersome botanical apparatus that connected nature study to intellectual and scientific pursuits. On the other hand, some writers—most notably, Frances Parsons—embraced the scientific aspects of late-century nature study and made lucrative careers out of publishing field guides to flowers, ferns, and trees, guides that taught readers how to see the silent battles taking place in everyday woods and fields.

But were these options truly mutually exclusive, or did a middle ground perhaps exist that could accommodate sentiment and morality as well as "rational" scientific investigation? Charles Darwin, as Treat learned, did not conceive of nature as a bloodless and amoral machine. Rather, he drew on the work of the scientists that Cooper admired and envisioned a world dominated by interconnection and coadaptation. Darwin's theory of evolution reconfigured the role of moral instincts in community development. For him, the moral codes of human and nonhuman communities were not

put in place by an all-knowing deity. Instead, they came into being according to an evolutionary narrative: beginning as instincts, moral codes arose as an individual's understanding of the social good developed, and morality followed from the utilitarian principle of the greatest good for the greatest number. Such behaviors as sympathy and benevolence—key features of the sentimental culture fostered by early nature study—hardly vanished under the evolutionary rubric, as Darwin noted that they were essential to the development of strong communities.[4]

But morality also entered the picture created by Darwinian science in another way in the late nineteenth century. As Peter Bowler notes, Darwin's theory, which emphasized the interactions between organisms and their environment, also "made it clear that species could be driven to extinction when the conditions to which they were exposed changed too rapidly for them to cope."[5] The persistent focus on community and on the natural world as an organic whole certainly influenced the way women studied and wrote about nature in the twentieth century. In particular, many women belonged to an increasingly vocal minority making a case for environmental protection and conservation in the face of mounting pollution, species decimation, and environmental exhaustion. Ecology, the study of the ways in which organisms interact with each other and their environment, also developed into a full-fledged scientific discipline during the 1880s and 1890s. Although early ecologists were not necessarily interested in promoting ethical treatment of the land, the principles of the science nevertheless proved valuable to later scientists/environmentalists such as Aldo Leopold and Rachel Carson who were looking to construct an ethics of land use.[6]

Many women writers embraced the challenge offered by the new vision of nature produced by these sciences, redirecting their moral impulses outward into appeals for environmental protection.[7] "Home" remained at the center of women's writings about nature because of its potency as an image of community and connection. Domestic spaces were essential because they offered insights into worlds not necessarily visible when one took a wide view, and this perspective enabled women writers to offer a conservation ethic at odds with one determined to protect grand vistas. Women argued that the local and the familiar mattered. Following in Cooper's footsteps, other writers began to record abuses to the land. Mary Austin, for example, condemned the violent diversion of water courses to feed growing urban areas (*The Ford* [1917]) while writing elegies to the land

and communities destroyed by those diversions (*The Land of Little Rain* [1903]). Carson brilliantly transformed the moral geography of the natural world into a map of commercial contamination in 1962's *Silent Spring*. Carson utilized Cooper and Treat's metaphors of home and family, albeit now hopelessly diseased by technology, to challenge the rhetoric of humans' chemical domination of nature. Austin, Carson, and others adopted their predecessors' proto-ecological perspectives, calling on humans to respect the natural world for its inherent rather than instrumental value, but adapted those perspectives to a world in which human and nonhuman communities existed side by side.

Throughout the nineteenth century, women discovered that as they studied the natural world, it became endowed with value. The foreign land outside the home underwent a change from "undifferentiated space," an abstract entity unknown and out there, to "place," a known and habitable location, to borrow geographer Yi-Fu Tuan's terms.[8] In questioning how humans represented their environment, these writers pointed to the equally important need to preserve that environment and the creatures in it.

# NOTES

## INTRODUCTION. THE LANGUAGES OF NATURE

1. I use the term *moral* rather than *religious* throughout this study to conform to the language preferred by the writers under investigation. Nineteenth-century usage of the term *moral*, especially in the context of nature study, is wedded to Christian religious tenets at least until the advent of Darwinian evolution. Although, as Seaton notes, modern commentators prefer to employ *religious* to indicate the "consistent religious basis of the times," nineteenth-century writers preferred the larger category of *moral*, which "tended to subsume the term *religious*" under it (*Language of Flowers*, 32–33).

2. See Seaton, *Language of Flowers*, for the most complete examination of the sentimental flower language book to date.

3. I thank Rochelle Johnson for helping me to clarify this point.

4. This analysis focuses on the experience of nature for middle- to upper-class white women and does not explore the experience of nature for minority or working-class women. Such further study is long overdue and would undoubtedly constitute a major contribution to the field.

5. Crary, *Techniques of the Observer*, 5.

6. Rossiter, *Women Scientists in America*, xv.

7. Gillispie, *Genesis and Geology*, 30.

8. Paley, *Natural Theology*, 13, 22, 44.

9. Ruse, *Darwinian Revolution*, 70.

10. Bowler, *Norton History of the Environmental Sciences*, 155, 150.

11. See Charlotte Porter, *Eagle's Nest*, for a good discussion of the difficulties surrounding the shift from Linnaean classification, especially her account of Nuttall's use of the sexual system (63).

12. Although I discuss in more detail elsewhere the figures mentioned in passing here, I have grossly oversimplified a complex historical period to identify the key developmental trends in the history of nineteenth-century science that are relevant to the discussion of women and the scientific tradition. There are several excellent resources for those interested in this period. A good primer on the subject is Bowler, *Norton History of the Environmental Sciences*. Ruse, *Darwinian Revolution*, 36–74, provides a thorough explanation of the position of important scientists of the period relative to

the debate over evolution. See also Gillispie's classic *Genesis and Geology* for a discussion of geological science's impact in England.

13. Raup, "Trends," 325.

14. Ruse, *Darwinian Revolution*, 40, 38.

15. Raup, "Trends," 327.

16. Darwin's effect on the scientific discussions of the mid- to late nineteenth century in both America and Europe has been well discussed, but little work has been done on Darwin's impact on women writing about the natural world. For discussions of Darwin's impact on the scientific traditions in England and America, see Ruse, *Darwinian Revolution*; Bowler, *Charles Darwin*; Ghiselin, *Triumph of the Darwinian Method*; Himmelfarb, *Darwin and the Darwinian Revolution*; Russett, *Darwin in America*.

17. For extensive biographical and bibliographical information on nineteenth-century women working in the sciences in both England and America, see Creese, *Ladies in the Laboratory?* See also Elizabeth Wagner Reed, *American Women*.

## ONE. BOTANY'S BEAUTIFUL ARRANGEMENT

1. Colden to Dr. John Frederic Gronovius, October 1, 1755, in Cadwallader Colden, *Letters and Papers*, 29–30.

2. Kohlstedt, "In from the Periphery," 83.

3. These botanical exchanges are noted throughout her father's correspondence for 1753–60. See Cadwallader Colden, *Letters and Papers*, 229–63.

4. Reveal, *Gentle Conquest*, 60.

5. Collison's letters to Linnaeus quoted in Rickett, "Jane Colden as Botanist," 23. For more information on Colden, see Bonta, *Women in the Field*, 5–8.

6. Jane Colden, *Botanic Manuscript*, 46, 80.

7. Catherine Maria Sedgwick, "Cacoethes Scribendi," 25.

8. Ibid., 28, 30, 31.

9. Ibid., 32.

10. Catherine Maria Sedgwick, *Means and Ends*, 239, 238, 241.

11. Steinbrugge, *Moral Sex*, 100.

12. Botany appears as a resource for mothers and other young women in Gardner, *Extracts* (1864) and Howland, *Papa's Own Girl* (1874). Romance abounds in the botanical excursions found in Towles, "Orphan's Miniature" (1868); A. E. Porter, *Married for Both Worlds* (1871); Thompson, *Rectory of Moreland* (1860); Harris, *Perfect Adonis* (1875). The excuse of a botanical trip rescued a girl's threatened reputation in Hume, *Woman's Wrongs* (1872), checked a girl's self-absorption in Harland, *Hidden Path* (1855), and led a girl to benevolence in Pike, *Here and Hereafter* (1858).

13. Keeney, *Botanizers*, 12.

14. Phelps, *Familiar Lectures*, 14. Hereafter cited in text. *Familiar Lectures* was first published in 1829 as *Mrs. Lincoln's Botany*.

15. Phelps, *Female Student*, 268. Hereafter cited in text.

16. Most of the few botanical textbooks available when Phelps wrote *Familiar Lectures* were out of date or useful primarily for advanced botanical study. These textbooks included Barton, *Elements of Botany* (1803); Locke, *Outlines of Botany* (1819); Eaton, *Manual of Botany* (1818); Nuttall, *Introduction to Systematic and Physiological Botany* (1827). Nuttall's textbook employed the classification systems of both Linnaeus and Jussieu. See Rudolph, "Almira Hart Lincoln Phelps," 1162–63, for more information on the state of botanical textbooks at the time of Phelps's writing.

17. See Rossiter, *Women Scientists in America*, 7. The exact number of copies sold is unknown, although some historians note that *Familiar Lectures* may have sold as many as 350,000 copies. See Bolzau, *Almira Hart Lincoln Phelps*, 234; Keeney, *Botanizers*, 61; Reed, *American Women*, 147; Baym, *American Women*, 18.

18. Keeney, *Botanizers*, 55.

19. Phelps, *Mrs. Lincoln's Botany*, n.p.

20. Phelps lists her sources in the preface. Tournefort (1632–1723), a precursor to Linnaeus, developed a classification system that organized plants relative to the form of the corolla. Bartram (1699–1777) was a noted American botanist who developed the first botanical garden in the American colonies with plants he collected. Rousseau (1712–78), the great French philosopher and social and political theorist, also published two books on botanical subjects, *Lettres Elementaires* (1771–73) and *Dictionnaire de Botanique* (1802, posthumous). Mirbel (1776–1854) was a noted French botanist who employed the microscope in his study of plant cell structure. Torrey (1786–1859), a student of Amos Eaton, was a noted botanist, naturalist, and ornithologist. He was an early American advocate of Jussieu's natural system and published with Asa Gray the monumental *A Flora of North America* (1838–43). Phelps's mastery of the sources for scientific study is also clearly apparent in her *Female Student*. Among the authorities she freely cites are Galileo, Newton, Lavoisier, Cavendish, and Cuvier.

21. Howard, *Publishing the Family*, 223. See also Hendler's account of "public sentiments" in *Public Sentiments*, which notes that sentiment "required the cultivation of a moral and proper repertoire of feelings, a sensibility" (2). This sensibility provides a guide for moral action.

22. *Oxford English Dictionary*.

23. Phelps, *Mrs. Lincoln's Botany*, iv.

24. Phelps, *Reviews*, 285.

25. Gates and Shteir, *Natural Eloquence*, 10.

26. Norwood, *Made from This Earth*, 22.

27. Phelps, *Reviews*, 285.

28. Steinbrugge, *Moral Sex*, 33.

29. Norwood, *Made from This Earth*, 2. Norwood places Phelps's use of Milton's Eve in the context of historical trends that removed women from a useful and necessary contact with the natural world—that is, "large-scale industrial agriculture," "slaveholding," and western migration (2–3).

30. Kohlstedt, "Parlors, Primers, and Public Schooling," 175. Kohlstedt employs this

term to describe the process of domestic education, noting that girls in the home often received their scientific educations from their parents, who then constitute the girls' "scientific genealogy."

31. Milton, *Paradise Lost*, 5.87–88.

32. Phelps, *Christian Households*, 20.

33. Norwood, *Made from This Earth*, 11.

34. Samuel Johnson, *Dictionary*; Webster, *American Dictionary*.

35. Myers, "Science for Women and Children," 172. See also Seaton, *Language of Flowers*, 24–25.

36. Wakefield, *Introduction to Botany*, 2.

37. Shteir, *Cultivating Women, Cultivating Science*, 86.

38. Ibid., 81. See also Lindee, "American Career."

39. Myers, "Science for Women and Children," 179.

40. Baym, *American Women*, 25.

41. See Cogan, *All-American Girl*, for an excellent discussion of the importance of exercise and fresh air for the "real woman" of the nineteenth century. Cogan posits that the ideal of the "real woman," which stressed intelligence, physical fitness, and self-sufficiency, represented a more influential (and healthier) model of femininity than the competing ideal of "true womanhood," which Welter argues tied female action absolutely to "four cardinal virtues—piety, purity, submissiveness and domesticity" (*Dimity Convictions*, 21).

42. Treat, "Botany for Invalids, No. II," 70.

43. Cogan, *All-American Girl*, 39.

44. Treat, "Botany for Invalids, No. I," 39.

45. Elizabeth Wright, *Lichen Tufts, from the Alleghenies*, 12, 14.

46. Phelps's inclusion of *domestics* in this passage seems striking, but it actually places her firmly in line with the popular domestic manuals produced by Catherine Maria Sedgwick (*Home*, 1835), Eliza Leslie (*House Book*, 1840), and Catharine Beecher (*Treatise*, 1841).

47. Howard, *Publishing the Family*, 224.

48. Locke, *Essay Concerning Human Understanding*, 286, 45, 41.

49. Ibid., 65.

50. Eric Wilson, *Romantic Turbulence*, 65.

51. See Locke's discussion of property and labor in "Second Treatise of Government," 283–86.

52. See Descartes, *Discourse on Method*, 24–25.

53. No systematic study has examined the question of species eradication as a result of amateur and professional collecting practices in the nineteenth century, although some anecdotal evidence confirming this possibility exists. Such a study would greatly contribute to our understanding of the impact of leisure nature activities on natural ecosystems.

54. See Keeney, *Botanizers*, 62–63, for a discussion of the pedagogical value of Lin-

naean classification for both Phelps and Eaton. Norwood, *Made from This Earth*; Charlotte Porter, *Eagle's Nest*; Keeney, *Botanizers*; Baym, *American Women*, discuss Phelps's use of Linnaeus strictly in terms of her pedagogy.

55. See Koerner, "Purposes of Linnaean Travel"; Mackay, "Agents of Empire," for discussions of botanical expeditions and imperialism.

56. Bowler, *Norton History of the Environmental Sciences*, 53.

57. Ibid., 158–59.

58. Erasmus Darwin, *Loves of the Plants*, vii.

59. Shteir, *Cultivating Women, Cultivating Science*, 16.

60. Ibid. Many scholars have investigated the relationships among botanical science, sexual codes, and gender hierarchies. See Schiebinger, *Nature's Body*; Browne, "Botany for Gentlemen"; Bedwell, " 'On the Banks of the South Sea.' "

61. Shteir, *Cultivating Women, Cultivating Science*, 16; Schiebinger, *Nature's Body*, 11–39.

62. Linnaeus, *Dissertation*, 27.

63. Erasmus Darwin, *Loves of the Plants*, 48, x.

64. Ibid., lines 119–24.

65. Ibid., 14.

66. Steinbrugge, *Moral Sex*, 30–34.

67. Keeney, *Botanizers*, 52.

68. Seaton, *Language of Flowers*, 117–18.

69. Linnaeus, *Dissertation*, 32, 33.

70. Kohlstedt, "Parlors, Primers, and Public Schooling," 174, 177. As Kohlstedt notes, the parlor frequently served as the location for informal scientific discussions: this "domestic setting for scientific discussion reflects the permeability of public and private knowledge." For a good discussion of items typically found in Victorian parlors, see Logan, *Victorian Parlour*, 124–46.

71. Willard, *Plan*, 14–15.

72. Shteir, *Cultivating Women, Cultivating Science*, 158.

73. Seaton, *Language of Flowers*, 86.

74. See, for example, A Lady, *Alice Granger*; *Household Narratives*; Bullard, *Matrimony*; Grace Greenwood, *Greenwood Leaves*; Hunter, *Clifford Family*; McIntosh, *Violet*.

75. Seaton, *Language of Flowers*, 2.

76. Merish, *Sentimental Materialism*, 3. More study needs to take place on the connection between sentimental flower culture, as represented in flower books, and the commodity culture of the nineteenth century. Several critics examine the role of sentiment in nineteenth-century America, including Merish, *Sentimental Materialism*; Howard, *Publishing the Family*; Hendler, *Public Sentiments*; Noble, *Masochistic Pleasures of Sentimental Literature*.

77. Howard, *Publishing the Family*, 240.

78. Phelps provides only the title information for these sources, and the identifica-

tion of Lucot's work is not certain. Seaton writes that this popular text "is simply an alphabetical listing of plants, describing the plant briefly and then giving its meaning" (*Language of Flowers*, 74). This style conforms to the one Phelps employed in her text.

79. Seaton, *Language of Flowers*, 2.

80. Baym, *American Women*, 40. See also Okker, *Our Sister Editors*.

81. Dumont, *Language of Flowers*, 5–6.

82. Coxe, *Floral Emblems*, 6.

83. Ibid., 17–18.

84. Elizabeth Wright, *Lichen Tufts, from the Alleghenies*, 32. Wright also published an article on mycology, "Something about Fungi," in *Putnam's Monthly Magazine*.

85. Susan Fenimore Cooper, *Rural Hours*, 83.

86. Keeney, *Botanizers*, 56.

87. The copy of the 1839 edition is in possession of the author. The copy of *Mrs. Lincoln's Botany* (1831) is in the collection at the Huntington Library, Pasadena, Calif.

88. Phelps, *Mrs. Lincoln's Botany*, vi.

89. Gray quoted in Keeney, *Botanizers*, 65.

90. Phelps, *Mrs. Lincoln's Botany*, vi–vii.

## TWO. THE PRESSURE OF HIDDEN CAUSES

1. Fuller, *Summer on the Lakes*, 3. Hereafter cited in text.

2. Fuller, *Letters of Margaret Fuller*, 3:123, 124.

3. Ibid., 3:123.

4. Ibid., 3:137.

5. Quoted in Stephenson, *Goethe's Conception*, 60.

6. Walls, *Seeing New Worlds*, 16.

7. Ibid., 18.

8. Sapp, *Genesis*, 17.

9. Koerner, "Goethe's Botany," 129.

10. Walls, *Seeing New Worlds*, 18.

11. Much of the modern critical literature on *Summer on the Lakes* places Fuller's diverse interest in the context of her feminism. See Douglas, *Feminization of American Culture*, 313–48; Haronian, "Margaret Fuller's Visions"; Kolodny, *Land before Her*; Zwarg, *Feminist Conversations*, 97–124. See also Steele, *Transfiguring America*.

12. Smith, introduction, ix.

13. Although not the focus of this discussion, Fuller's experiences with indigenous and settler women on the frontier clearly affected her understanding of women's position in American culture. Steele writes in the introduction to *The Essential Margaret Fuller* that "*Summer on the Lakes* extends the argument begun in 'The Great Lawsuit' by linking the analysis of gender differences to that of racial difference" (xxiii). Steele connects this change in perspective directly to Fuller's physical movement across the frontier.

14. Vasquez, *Authority and Reform*, 207, 208.

15. Smith, introduction, ix. See Smith's introduction to *Summer on the Lakes* for a more complete description of the conditions of the text's production (ix–xii).

16. Fuller, *Letters of Margaret Fuller*, 3:140, 141, 143, 147.

17. Buell, *Literary Transcendentalism*, 188.

18. See Adams, " 'That Tidiness' "; Myerson, *Critical Essays on Margaret Fuller*; Steele, *Transfiguring America*; Tonkovich, "Traveling in the West"; Urbanski, "Seeress of Prevorst."

19. Steele, *Transfiguring America*, 139–40.

20. Martels, introduction, xii.

21. Scheese, *Nature Writing*, 6.

22. Myerson, *Critical Essays on Margaret Fuller*, 4.

23. Ibid., 5.

24. Fuller, *Letters of Margaret Fuller*, 2:204.

25. Goethe, *Goethe's Theory of Colors*, 319. Hereafter cited in text.

26. Honderich, *Oxford Companion to Philosophy*, 321.

27. Schaffer, "Glass Works," 79. Schaffer provides an excellent discussion of the importance of prisms to Newton's experimentation.

28. Crary, *Techniques of the Observer*, 73. See also Sepper, *Goethe contra Newton.*

29. Ribe and Steinle, "Exploratory Experimentation," 48.

30. Crary, *Techniques of the Observer*, 69.

31. Hawthorne, "My Visit to Niagara," 96.

32. Tocqueville quoted in Irwin, *New Niagara*, 19.

33. Locke, *Essay Concerning Human Understanding*, 42.

34. Rueger, "Cultural Use of Natural Knowledge," 216.

35. Ribe and Steinle, "Exploratory Experimentation," 45, 44.

36. Rueger, "Cultural Use of Natural Knowledge," 219, 218.

37. Haronian, "Margaret Fuller's Visions," 37. See also Haronian, "Margaret Fuller." Haronian's work provides an excellent analysis of the ways in which the terminology of optical and electromagnetic sciences informed the vocabulary of Fuller's feminism. See also Baker, " 'Commanding View,' " for a discussion of the intersection of perception and nation in Fuller's writing.

38. Fuller, *Letters of Margaret Fuller*, 3:77.

39. Haronian, "Margaret Fuller's Visions," 50.

40. Burke, *Philosophical Enquiry*, 58.

41. Novak, *Nature and Culture*, 35.

42. Zwarg, *Feminist Conversations*, 100.

43. Steele, *Transfiguring America*, 142.

44. Stephenson, *Goethe's Conception*, 54.

45. Fuller, *Letters of Margaret Fuller*, 2:108.

46. Fuller, *Memoirs of Margaret Fuller Ossoli*, 263.

47. Ibid., 329. See Cole, "Woman Questions," for a discussion of educational and social reform in Fuller's work.

48. Adams, " 'That Tidiness,' " 252.

49. According to Cristina Zwarg, Fuller relied heavily on George Catlin's *Letters and Notes on the Manners, Customs, and Condition of the North American Indian* (1841) as she scripted her account of Native Americans on the Plains. Zwarg notes that "the argument for the inevitable extinction of Native Americans permeated many of the books" Fuller read as she wrote *Summer on the Lakes*. Charles Murray's *Travels in North America during the Years 1834, 1835, & 1836* (1839) was another important text, as was James Adair's *History of the American Indians* (1775) and Henry Rowe Schoolcraft's *Algic Researches, Comprising Inquiries Respecting the Mental Characteristics of the North American Indians* (1839), which Fuller read while traveling. See Zwarg, *Feminist Conversations*, 107–13, for a detailed account of these texts and their influence on Fuller's views of Native Americans.

50. Clark and Halloran, *Oratorical Culture*, 11.

51. Buell, *Literary Transcendentalism*, 90.

52. Ibid., 23–54.

53. Eric Wilson, *Romantic Turbulence*, xiv.

54. Rouse, "Margaret Fuller," 119.

55. Emerson, "Nature," 31.

56. Emerson, "Self-Reliance," 46–47.

57. Fuller, *Letters of Margaret Fuller*, 2:109.

58. Osgood, *Poetry of Flowers*, 122, 262.

59. Eric Wilson, *Romantic Turbulence*, xix. Fuller's interest in "being and becoming," in time as process, reflects the tensions of her time, which Novak identifies as representing "a particular juncture of neoclassicism and romanticism, of Newtonian mechanics and proto-evolutionary organicism" (*Nature and Culture*, 109). Walls identifies this moment as the point when "rational holism," which defines nature as a "mechanico-organic whole . . . a divine or transcendent unity fully comprehended only through thought," gives way to "empirical holism," which "stressed that the whole could be understood only by studying the interconnections of its constituent and individual parts" (*Seeing New Worlds*, 4). Fuller finds herself precisely at the center of this juncture as she attempts to navigate Niagara's treacherous waters.

60. McKinsey, *Niagara Falls*, 216. Both McKinsey and Douglas argue for the preeminence of history in Fuller's interpretative schema. According to McKinsey, "A historical strategy is the key to [Fuller's] search for Niagara's meaning" (*Niagara Falls*, 216). Douglas also discusses Fuller's "historical consciousness" and states that her "essential vision was not literary, not metaphorical, but historical" (*Feminization of American Culture*, 320, 337). Although this view of Fuller's use of history is accurate (for example, in her description of the "true utilitarian" and his good use of history), she rarely trusts the historical accounts that she reads. See also Zwarg, *Feminist Conversations*, 100–103, for more discussion of this passage.

61. Susan Fenimore Cooper, *Rural Hours*, 57.

62. Irwin, *New Niagara*, 10.

63. Ibid., 12.

64. Ibid., 18.
65. Adams, " 'That Tidiness,' " 252.
66. Fuller, *Letters of Margaret Fuller*, 2:108.
67. Ibid., 3:141, 143.
68. Stilgoe, *Borderlands*, 11.
69. Fuller, *Letters of Margaret Fuller*, 2:109.
70. Willard, *Plan*, 6.
71. Fuller, *Letters of Margaret Fuller*, 2:109.
72. Kolodny, *Land before Her*, 130.
73. Steele, introduction, xxv.
74. Kolodny, *Land before Her*, 130.
75. Douglas, *Feminization of American Culture*, 337.
76. Thoreau, "Walking," 221.
77. Tonkovich, "Traveling in the West," 83.
78. Koerner, "Goethe's Botany," 129.
79. Fuller, "Magnolia of Lake Ponchartrain," 45.
80. Fuller, "Autobiographical Romance," 31–32.
81. Fuller, "Yuca Filamentosa," 51, 52.

## THREE. THE NOBLE DESIGNS OF NATURE

1. The title of the seventh U.S. edition was changed to *Journal of a Naturalist in the United States* to capitalize on Cooper's success as the editor of Knapp, *Country Rambles in England* (1853). A new edition of *Rural Hours*, with a new preface and added chapter, "Later Hours," appeared in 1868. A final, radically abridged version of the text was published in 1887. See Rochelle Johnson and Daniel Patterson's introduction for a thorough discussion of the publishing history of *Rural Hours*, including James Fenimore Cooper's efforts with publishers on his daughter's behalf (xi–xv).
2. Reynolds, *Beneath the American Renaissance*, 389.
3. Susan Fenimore Cooper, *Rural Hours*, 3. Hereafter cited in text.
4. Stefaniak, "Botanical Gleanings," 234.
5. Austin, *Land of Little Rain*, 112.
6. Reynolds, *Beneath the American Renaissance*, 9.
7. *Rural Hours* has recently begun to garner critical attention as scholars come to understand how this text fits into midcentury discussions of nature, science, language, and perception. The most comprehensive collection of critical articles on the text and its author is Johnson and Patterson, *Susan Fenimore Cooper*. See also Norwood, *Made from This Earth*; Buell, *Environmental Imagination*; Baym, *American Women*.
8. Buell, *Environmental Imagination*, 220. For a useful discussion of Cooper's visions of time, see Dawes, "Farther Progress."
9. Humboldt, *Cosmos*, 2–3.

10. LeMahieu, *Mind of William Paley*, 172.

11. Novak, *Nature and Culture*, 25, 6.

12. Susan Fenimore Cooper, "Later Hours," 49, 51; Bachelard, *Poetics of Space*, 103.

13. Susan Fenimore Cooper, "Later Hours," 50.

14. The description of the eider duck's nest is part of a larger commentary on the rapaciousness of humans and the threat they pose to animal populations. In the case of the eider duck, "greedy man" takes from the nest the first set of eggs the female lays, along with the down. Cooper continues, "The patient creature then re-lines her nest with the last down on her breast, and lays a few more eggs; again both down and eggs are taken by greedy man; the poor mother has no more down to give, so the male bird steps forward, and the nest is lined a third time. Two or three eggs are then laid, and the poor creatures are permitted to raise these—not from any kindly feeling, but to lure them back to the same spot again the following year, for they like to haunt familiar ground" (257).

15. Michelet quoted in Bachelard, *Poetics of Space*, 101.

16. Cott, *Bonds of Womanhood*, 1. For a compelling discussion of the role of the home in *Rural Hours*, see Norwood, *Made from This Earth*, 27–42. For an examination of the "Cult of True Womanhood," see Welter, *Dimity Convictions*, 21–41; Smith-Rosenberg, *Disorderly Conduct*, 173–76. For a discussion of the competing ideal of the "real woman," see Cogan, *All-American Girl*, 4–61.

17. See Howard's chapter, "What Is Sentimentality?" in *Publishing the Family*, especially 233–41, for an excellent account of the way in which critical understanding of the "separate spheres" argument has shifted over the past several decades.

18. Susan Fenimore Cooper, "Female Suffrage" (no. 244), 597.

19. Cott, *Bonds of Womanhood*, 71, 70.

20. King, "Customary Rights and Women's Earning," 466, 473.

21. Stefaniak, "Botanical Gleanings," 234.

22. Emerson, "Nature," 36.

23. Bowler, *Norton History of the Environmental Sciences*, 204.

24. Thoreau, *Walden*, 6; Keeney, *Botanizers*, 100.

25. Manes, "Nature and Silence," 19.

26. Miller, *Transcendentalists*, 53. On the doctrine of correspondence, see Miller, *Jonathan Edwards*, 165–95. For an excellent discussion of language theories and theology in nineteenth-century America, see Gura, *Wisdom of Words*, 75–105.

27. Keeney, *Botanizers*, 103.

28. DeRogatis, *Moral Geography*, 4.

29. Beer, *Open Fields*, 149.

30. Seaton, *Language of Flowers*, 25.

31. Susan Fenimore Cooper, introduction, 29.

32. Ruse, *Darwinian Revolution*, 65. For discussions of higher criticism and biblical authority in the American context, see Gura, *Wisdom of Words*, 15–31; Packer, "Origin and Authority."

33. Clark and Halloran, introduction to *Oratorical Culture in Nineteenth-Century America*, 11.

34. Bowler, *Norton History of the Environmental Sciences*, 176. See also Raup, "Trends," 322–27, for a good description of the state of the science in the mid-nineteenth century in general and Humboldt's work in the field in particular.

35. Keeney, *Botanizers*, 103.

36. Bowler, *Norton History of the Environmental Sciences*, 163–64.

37. Ibid., 197.

38. Ibid., 225. See also Agassiz, *Geological Sketches*; G. Frederick Wright, "Agassiz and the Ice Age."

39. Buell, *Environmental Imagination*, 406.

40. Charles Darwin, *Correspondence of Charles Darwin*, 10:505, 11:1. Darwin read excerpts from the "Summer" and "Autumn" chapters of *Rural Hours*, including the entry for June 6, where Cooper remarks on the profusion of "naturalized plants" or "weeds" that "do not belong here, but following in the footsteps of the white man, they have crossed the ocean with him." In his November 6 letter to Gray, Darwin writes that Cooper's "Book gives an extremely pretty picture of one of your villages; but I see your autumn, though so much more gorgeous than ours, comes on sooner, & that is one comfort" (*Correspondence of Charles Darwin*, 10:505).

41. See Ruse, *Darwinian Revolution*, for an excellent explanation of the various positions—for, against, and neutral—that prominent scientists of Darwin's day took on evolution. Cooper cites Humboldt's South American travel narratives in *Rural Hours* (75, 302). As Johnson and Patterson point out, Cooper also relies on Humboldt's history of the representation of nature in art found in *Cosmos* in her introductory essay to *Rhyme and Reason of Country Life*, an anthology of nature poetry (xvii). She twice cites Cuvier in *Rural Hours*. In the first instance, he firmly settles a question of the identity of the ibis (267). In the second, she identifies herself with contemporary scientists and dismisses Cuvier's interpretation of the actions of bank swallows, noting that the ideas he supported have been "quite abandoned for want of proof" (329 n.24). See Bowler, *Norton History of the Environmental Sciences*, 208, for a discussion of Cuvier's hypothesis on the action of bank swallows.

42. Richards, "Darwin," 93.

43. Sloan, "Making," 25.

44. Keeney, *Botanizers*, 99.

45. Elizabeth Wright, *Lichen Tufts, from the Alleghenies*, 32.

46. Maddox, "Susan Fenimore Cooper," 141.

47. See Bowler, *Norton History of the Environmental Sciences*, 166–69.

48. Smithline, *Natural Religion in American Literature*, 97.

49. See Bergen, "Popular American Plant Names II"; Bergen, "Some Bits of Plant-Lore."

50. Nevius, *Cooper's Landscapes*, 89.

51. Novak, *Nature and Culture*, 20.

52. Halloran, "Rhetoric of Picturesque Scenery," 229.

53. For discussions of the problems of the picturesque, see Copley and Garside, introduction; Michasiw, "Nine Revisionist Theses," 72–100.

54. Byerly, "Uses of Landscape," 54, 55, 53.

55. Halloran, "Rhetoric of Picturesque Scenery," 243.

56. Susan Fenimore Cooper, "Dissolving View," 79. Hereafter cited in text.

57. Bermingham, "Picturesque and Ready-to-Wear Femininity," 85.

58. Gilpin, "On Picturesque Travel," 42. For a good discussion of the compositional elements of the picturesque scene, see Lueck, *American Writers*; Copley and Garside, introduction.

59. Gilpin quoted in Lueck, *American Writers*, 12–13.

60. DeRogatis, *Moral Geography*, 7.

61. Leopold, *Sand County Almanac*, 246.

62. Branch, "Five Generations of Literary Coopers," 69.

63. Susan Fenimore Cooper, "Lament for the Birds," 473.

64. Maddox, "Susan Fenimore Cooper," 141. See also Branch, "Five Generations of Literary Coopers."

65. Brooks, *Speaking for Nature*, xv.

## FOUR. SPIDERS, ANTS, AND CARNIVOROUS PLANTS

1. Treat, *Home Studies in Nature*, 6. Hereafter cited in text.

2. Female readers had also been primed to accept the idea of a domesticated nature. By 1885, women stood at the forefront of national bird protection efforts, with particular emphasis on eliminating the use of feathers for women's hats. Throughout *Home Studies in Nature*, Treat stresses reciprocity and responsibility in the natural world, and she argues repeatedly and strenuously for bird protection laws.

3. For a discussion of the ways in which editors capitalized on the increased popular interest in the scientific approach and scientific debates, see Pizer, *Cambridge Companion*, 26–27. Ellery Sedgwick notes that the *Atlantic Monthly* "carried the first major American exposition and defense of Darwin" and that "the essential tenets of Darwinism were well entrenched in the magazine by the 1870s" (*Atlantic Monthly*, 10). See Ellery Sedgwick, *Atlantic Monthly*, 113–99, for a comprehensive discussion of William Dean Howells's and Thomas Aldrich's editorship during the years in which Treat published her articles. Scholars are becoming interested in understanding the ways in which evolution, as distinct from Social Darwinism, shaped narratives in nineteenth- and twentieth-century fiction. See Beer, *Darwin's Plots*, for an early and influential analysis of Darwinian evolution and nineteenth-century fiction. See also Bender, *Descent of Love*, for an excellent examination of the ways in which American authors responded to Darwinian sexual selection in courtship scenes and novels in the late nineteenth century. See also Carroll, *Literary Darwinism*; Carroll, "Organism, Environment, and Literary Representation."

4. Darwin's grandfather, Erasmus Darwin, gestured toward evolution in his account of plant development in *Loves of the Plants*. See Appleton, *Darwin*, for a thorough selection of primary source materials that influenced Darwin's explication of the mechanisms of evolution. See also Browne, *Charles Darwin*, for a biographical account of Darwin's research into and response to early-nineteenth-century evolutionary theories.

5. See Watson, "Zephyranthes treatiae," for the announcement of the new species.

6. Rossiter, *Women Scientists in America*, xv.

7. Harshberger, *Botanists*, 298–99.

8. Charles Darwin, *Insectivorous Plants*, 281.

9. Rossiter, *Women Scientists in America*, xv.

10. Ibid.

11. Treat, "Botany for Invalids, No. I," 39.

12. Harshberger, *Botanists*, 299.

13. As Norwood notes, this work was often performed in the background of "real" science, with women working from home with dried specimens sent by scientific colleagues; such women were rendered largely "invisible" in the process of the production of knowledge (*Made from This Earth*, 70).

14. Norwood, for example, concludes, "Mary Treat was, however, much more Susan Cooper's soul mate than she was Charles Darwin's colleague. . . . For all its scientific voice, *Home Studies in Nature* is clearly a woman's book" (*Made from This Earth*, 41–42). Rossiter also presents Treat as a proponent of domesticity, but with the caveat that Treat's work needs further analysis (*Women Scientists in America*, 341 n.3).

15. Treat provides details of her excursions and her illnesses in letters to Charles Sprague Sargent, April 11, April 16, April 17, May 10, 1877, Archives of the Gray Herbarium, Harvard University, Cambridge, Mass. She writes about the importance of the microscope to nature study in *Through a Microscope*, a book she coauthored with Samuel Wells and Frederick Sargent.

16. Treat, *Two Chapters on Ants*, 13.

17. Rossiter, *Women Scientists in America*, xvii.

18. See Creese, *Ladies in the Laboratory?* 4. Charles Riley added a postscript to his November 10, 1874, letter to Mary Treat: "P.S. A propos. What has become of Mr. T.? Is he still separated from you?" (Mary Treat Papers, Vineland Historical Society, Vineland, N.J.).

19. Mary Treat to Charles Sprague Sargent, April 11, 1877, Archives of the Gray Herbarium, Harvard University, Cambridge, Mass. On April 27, 1877, Treat wrote to Sargent from Florida, "But you must send me some more stamps, for if I keep on much longer, I shall not have money enough to reach home" (Archives of the Gray Herbarium, Harvard University, Cambridge, Mass.).

20. Mary Treat to Charles Darwin, May 15, 1876, Darwin Papers, Cambridge University Library, Cambridge, Eng.

21. Receipt, Mary Treat Papers, Vineland Historical Society, Vineland, N.J.

22. See "Sophia McIlvaine Bledsoe Herrick" for more details on Herrick's life.

23. Creese, *Ladies in the Laboratory?* 3; Bonta, *American Women Afield*, 17–19.

24. Creese, *Ladies in the Laboratory?* 5.

25. For Treat's efforts, see Mary Treat to Asa Gray, April 2, April 5, April 9, April 13, April 23, April 24, May 7, May 14, 1887; Mary Treat to Charles Sprague Sargent, April 11, April 16, April 17, April 27, May 10, 1887, all in Archives of the Gray Herbarium, Harvard University, Cambridge, Mass.

26. See Regis, *Describing Early America*; Koerner, "Purposes of Linnaean Travel," for discussions of the importance of botanical excursions for burgeoning national interests.

27. Information on the Darwin-Treat correspondence can be found online at the comprehensive Darwin Correspondence Project Online Database (http://www.darwinproject.ac.uk/, accessed October 9, 2006). It is also available in Burkhardt and Smith, *Calendar*. In addition to Treat, Darwin also regularly corresponded with Gray and English botanists William Turner Thiselton-Dyer, W. D. Fox, and J. S. B. Sanderson regarding the habits of the *Drosera*, the *Utricularia*, and the *Pingularia*.

28. Treat, "Controlling Sex in Butterflies," 129, 131.

29. Charles Riley to Mary Treat, January 27, 1871, Mary Treat Papers, Vineland Historical Society, Vineland, N.J.

30. Mary Treat to Charles Darwin, December 20, 1871, Darwin Papers, Cambridge University Library, Cambridge, Eng.

31. Charles Darwin to Mary Treat, January 5, 1872, typescript, Darwin Papers, Cambridge University Library, Cambridge, Eng.

32. See Charles Darwin, *Insectivorous Plants*, 281, 311, 408, 430.

33. Norwood, *Made from This Earth*, 42.

34. Treat's extensive writings on "slave making" ants deserve extended study. Two essays, "Slave-Making Ants" and "The Harvesting Ants of Florida," were collected and published in *Two Chapters on Ants*. The third essay on ants appears as "Under the Maples" in *Home Studies in Nature*. In these essays, Treat describes the continual warfare that exists between two species of ants, the dominant red ant, *Formica sanguinea*, and the submissive black ant, *Formica fusca*.

35. Beer, *Darwin's Plots*, 23.

36. Charles Darwin, *Descent*, 216, 218. Hereafter cited in text.

37. Bender, *Descent of Love*, 51.

38. Treat, "Controlling Sex in Butterflies," 131.

39. Richards, "Darwin," 100.

40. Rachels, *Created from Animals*, 158.

41. Richards, "Darwin," 98, 97.

42. Bowler, *Norton History of the Environmental Sciences*, 306. See also Gray, *Darwiniana*, 14.

43. Borus, *Writing Realism*, 13.

44. Glazener, *Reading for Realism*, 40.

45. Cooper, for example, cites the utilitarian value of small birds, which aid farmers and gardeners by destroying "many troublesome insects," as a valid reason for their protection (*Rural Hours*, 329 n.28).

46. Norwood, *Made from This Earth*, 41.

47. Treat, "Notes," 359.

48. Treat borrows her language here directly from Darwin, who notes in *Descent* that an "anthropomorphous ape, if he could take a dispassionate view of his own case, would admit . . ." (130).

49. Beer, *Darwin's Plots*, 23.

50. This statement seems to share more affinity with Lamarckianism, a slightly older popular theory that argues that animals adapt in a single generation, rather than the Darwinian understanding of instinct and adaptation, which argues that animals unwittingly adapt over generations. The environment figures more prominently in Lamarck's view, where adaptation results directly from an individual's struggle with its environment, not, as Darwin finds, from a struggle with other individuals of the same species and the environment (Himmelfarb, *Darwin and the Darwinian Revolution*, 317). Treat's nature observations clearly draw on Darwin rather than on Lamarck's more outdated views. In this case, she does not contend that the adaptation will be immediately replicated in the succeeding generation, which follows from Lamarck's argument. Treat makes her relationship to and reliance on Darwin clear throughout the essays.

51. See Bachelard, *Poetics of Space*, for an excellent discussion of nest building and humans' fascination with animal nests: "A nest is generally considered to be one of the marvels of animal life. An example of this much vaunted perfection may be found in one of Ambrose Paré's works: 'The enterprise and skill with which animals make their nests is so efficient that it is not possible to do better, so entirely do they surpass all masons, carpenters and builders; for there is not a man who would be able to make a house better suited to himself and to his children than these little animals build for themselves. This is so true, in fact, that we have a proverb according to which men can do everything except build a bird's nest' " (92).

52. Borus, *Writing Realism*, 14. I cautiously use the term *realism* for several reasons. First, Treat was not self-conscious in her position as an author. Second, much of Treat's writing appeared before the idea of a realist "stance" or "conviction" (to use Michael Davitt Bell's terms) became established (*Problem of American Realism*, 6). Bell also argues convincingly about the difficulties of assuming that there "was a coherent tradition of 'realistic' practice in America" in the 1880s and 1890s (*Problem of American Realism*, 7). Nevertheless, the magazines of the *Atlantic* group, as Glazener calls them, were conscious of their efforts to promote "high culture" and to determine both what and how their audience should read. Glazener writes that the "emergence of the realist literary movement in the U.S. was crucially preceded by the construction of a specifically nationalist, implicitly philanthropic function for fiction." Realist texts make "daily life and its material conditions into worthy objects of representation" (*Reading for Realism*, 38, 40).

53. Glazener, *Reading for Realism*, 114.

54. Kant, preface, 109.

55. Borus, *Writing Realism*, 13.

56. Treat, *Two Chapters on Ants*, 14.

57. Taylor, "Spiders," 463.

58. Campbell, "Observer and Object," 27.

59. Harshberger, *Botanists*, 299.

60. Dupree, introduction, xix.

61. Treat, "Botany for Invalids, No. I," 39.

62. Asa Gray to Charles Darwin, December 11, 1874, Darwin Papers, Cambridge University Library, Cambridge, Eng.; Mary Treat to Asa Gray, December 7, 1874, Jane Gray Autograph Collection, Archives of the Gray Herbarium, Harvard University, Cambridge, Mass.

63. Erasmus Darwin, *Loves of the Plants*, line 27.

## EPILOGUE. HUMAN HOMES IN NATURE'S HOUSEHOLD

1. See Baym, *American Women*, 89–90, for more discussion of Cooper's changes to the 1887 edition.

2. See Creese, *Ladies in the Laboratory?* 2; Rossiter, *Women Scientists in America*, 51–72.

3. Sharp, "Woman Botanist," 93.

4. Darwin wrote in *Descent* that birds had been shown to "sympathize with each other's distress or dangers," whereas humans sought to "relieve the sufferings of another" (105).

5. Bowler, *Norton History of the Environmental Sciences*, 309.

6. Nash, *Rights of Nature*, 55.

7. See Breton, *Women Pioneers for the Environment*, for useful biographies of a wide range of late-nineteenth- and twentieth-century environmental activists.

8. Tuan, *Space and Place*, 6.

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